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ABSTRACT

A study was conducted to validate the Instructional Support System-Occupational Education (ISSOE) automotive mechanics curriculum. The following four steps were undertaken: (1) review of the ISSOE materials in terms of their "validity" as task statements; (2) a comparison of the ISSOE tasks to the tasks included in the V-TECS Automotive Mechanics catalog; (3) a comparison of the ISSOE tasks and the tasks contained in the Military Occupational Survey for Wheel Vehicle Mechanics; and (4) a similar comparison with the tasks included in the Soldier's Manual for Wheel Vehicle Mechanic. An initial review of the ISSOE materials found that 69% of the ISSOE tasks met task analysis criteria. The percentage of agreement of the three comparisons ranged from 66% to 75%, indicating substantial agreement in some of the major areas included in ISSOE and the three other lists. According to the study, ISSOE suffers only from lack of functional organization and some errors in level of specificity, duplication, improper statement of task, and perhaps some shortcomings in coverage. Two recommendations were made: (1) some of the ISSOE materials in other content areas should be subjected to analyses like this one; and (2) field surveys for some of the ISSOE materials similar in nature to the U.S. Army Survey should be undertaken to verify the findings of the earlier content validation. (CT)

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ED170506

INSTRUCTIONAL SUPPORT SYSTEM-OCCUPATIONAL EDUCATION II

ISSOE
AUTOMOTIVE MECHANICS
CONTENT VALIDATION

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Division of Occupational Education Instruction
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In preparing a curriculum that provides students with entry level job skills it is imperative that the content of the curriculum match as closely as possible industry's expectations for the program graduates. It is therefore necessary to examine the skills required of entry level job holders as they exist on the job and to compare these skills and knowledges with those being taught to the students in the occupational training program.

One economical approach to such a validation, and an obvious prerequisite to a large scale field survey of program graduates, is to compare a new curriculum with an existing curriculum that is based on actual field data descriptive of the skills and knowledges required for the job performance. The general problem investigated in this study may be stated as —to what degree do the Instructional Support System in Occupational Education (ISSOE) materials conform to the skills and knowledges included in other curriculums that have been validated?

Automotive mechanics was the first ISSOE curriculum to be developed and has undergone extensive revisions. As of this writing, 192 teachers of automotive mechanics are involved in revising and implementing this ISSOE curriculum. It was therefore perfectly reasonable to select automotive mechanics as the first ISSOE materials to be content validated. ISSOE materials were compared to the materials developed and used by the Vocational-Technical Consortium of States (V-TECS) and the United States Department of Defense (DOD).

Prior to carrying out comparisons among the three sets of tasks, it is necessary to establish the internal validity of the

ISSOE task list by first examining the items listed in ISSOE and their status as task statements. That is, a prerequisite to comparison of ISSOE to V-TECS and DOD materials presupposes that ISSOE statements constitute tasks. Therefore, the first phase in carrying out this validation study consisted of an examination of the ISSOE major objectives as a listing of statements which constitute tasks and recommendations for modifications of those statements which were not stated as tasks.

The report consists of the following five major subsections:

1) A very brief general description of task analysis and its procedures
2) A review and analysis of the ISSOE task list
3) A comparison of the ISSOE task list to the V-TECS task list
4) A comparison of ISSOE to the Department of Defense (DOD-U.S. Army) listings
5) A summary of the findings

Sections 2, 3, and 4 are each preceded by a brief description of the procedures used, some general comments and a summary of findings.

In dealing with the review and analysis of the ISSOE task list and its comparison to V-TECS and DOD materials, the analyses were carried out by the senior author and an experienced analyst. Subsequently, an external experienced analyst was asked to review the ISSOE, V-TECS and DOD materials. These latter analyses were then compared to the first set in terms of agreement with the classification and comments provided by the first set of reviewers. These data and comments of the external reviewer are provided in the body of the report in their respective sections.

Introduction to Task Analysis

The task list is the key element in the development of a valid occupational structure or training program. Before the first training analysis or training development can begin, the analyst or developer must know what it is that the job incumbent is expected to do.

Task list development can be accomplished in many ways. Persons expert in the field can assemble lists of tasks performed, trainers can extract tasks from current training (it is generally assumed that the subject under study has been trained even though no formal analysis has been conducted), or analysts can examine the work via literature search, observation-interview, and discussion with experienced job incumbents.

The process of collecting tasks continues until the staff feels confident that the list provides complete coverage of work performed at all levels of the occupation, or at least at the level being examined. Throughout the process attention is given to the construction of task statements on a comparable level of specificity. Level of specificity will prove of vital concern if procedures such as occupational surveys are to be used, or if analysts intend to "cost out" a training program task by task. If a survey is to be accomplished, job incumbents must be able to detect more or less equal values of time (if that is the measure used in the survey when rating the work they perform. Uncontrolled specificity in the task listing would make such ratings almost impossible. Wright (1974) includes the following eight steps in a complete job analysis:

1. A general description of the work to be done
2. The organizational setting and relationships in which the work is accomplished.
3. The specific tasks which are to be carried out by the worker.
4. The equipment, tools and materials to be used.
5. The working conditions, including special hazards.
6. The qualifications required to learn or to perform these tasks stated in terms of knowledges, skills, abilities and personal characteristics (including physical).
7. The expected manner or quality of performance.
8. The process and expected outcomes of the performance. (Wright, 1974, p.13)

Since job analysis is generally conducted at the task level, the task must be carefully defined. For the purpose of this project, the following operational definition has been used:

> Falling mid-way between a duty and an element, a "task" is a statement of a highly specific action. It has a definite beginning and end, is performed in relatively short periods of time, must be observable (in that a definite determination can be made that the task has been performed), must be measurable (in the sense that an observer may conclude that the task has or has not been properly performed), and is independent of other actions. Thus a task describes a finite and independent part of a job.

The definition cited above suggests that a listing of duties would be too broad and vague whereas a list of items written at the "element" level would be excessively long and detailed. Elements should appear (in ISSOE for example) as either major or enabling objectives, whichever is chosen to represent "how" the task is performed.

Experience in the military departments of the U.S. armed services reveals that approximately 600 to 700 tasks are sufficient to account for content of most occupations when the object of analysis is to provide coverage for all wage levels, levels of skill, levels of experience and job location. In the automotive maintenance trades, collected data

indicate that entry levels of skill can be accounted for with less than half that number of tasks. Individual performance of tasks can routinely be accounted for with less than 150 items. Note again, however, that level of specificity can have a significant bearing on the number of tasks in a listing. The analyst must decide in advance the purpose for which the listing will be used and determine the appropriate level of specificity accordingly.

Review of ISSOE Task List

The initial review of ISSOE tasks was accomplished without reference to V-TECS or other listings. The ISSOE modules were examined to determine if each task is valid (based upon the criteria discussed in the introduction) and comments pertaining to the individual tasks are provided. As pointed out above (pp. 3-4), there are many methods for development of task inventories. The process followed in this analysis has proven successful since it concentrates on level of specificity and the production of tasks which meet the previously discussed "rules" for relationship between duties, tasks and elements. Since it was not intended to rewrite the ISSOE curriculum, it has been assumed for the purpose of this analysis, that the ISSOE development group considered each task, major objective and enabling objective to be correct as written. That is, it was necessary to "freeze" ISSOE at this point in time so that it could be examined. Subsequent to this analysis, but too late for inclusion in this report, an updated ISSOE listing was made available. Undoubtedly some of the comments listed in this section which is based on the 1976-1977 listing have been incorporated in the 1978-1979 version. To facilitate use of this report with either ISSOE listing, the new module code numbers have been added to the original module page ID numbers and are listed in parentheses as in this example:

1 - 1 - 1 ———→ original #
(01-01-01) ———→ new #

A task referred to as "valid" has been judged to meet the test of specificity as well as the other previously stated rules. As pointed out in the third section of this report, the V-TECS task list seems to have been developed using the approach described in the task analysis section of this report.

The first section of the report will be of considerable help in making transitions from one ISSOE listing to the other.

To verify the initial ISSOE task list review and analysis, an independent evaluation was conducted by an experienced occupational analyst. These results were then compared to the original analyses. If disagreement was found or additional comments were believed relevant, they were provided.

Both sets of data are summarized in Table 1. Sixty-nine percent of the tasks listed in the ISSOE system were found to be "valid" in the sense that they met the criteria for statements included in general approaches to task analysis. Overall agreement between the two analyses was 95% with % agreement for individual ISSOE units ranging from 85% to 100%.

The overall impression of the modular curriculum is that it seems to lack both an introductory portion and sections on troubleshooting and/or fault detection. In addition, there seems to be nothing in the curriculum which tells the student why tasks are to be performed.

The first problem, lack of introduction, may be illusionary since students may have taken preliminary courses on engine operation, etc. The latter shortcomings, however, must be overcome. An effective training program should teach a student what to look for and why the action is accomplished. Fault detection may appear as a separate task (such as an ANALYZE or TROUBLESHOOT task) when it is performed for its own sake such as when a mechanic must seek out the problem producing various symptoms. It may be part of a task (commonly referred to an "element" or in ISSOE a "major objective") if the mechanic is performing a task which must, in and of itself, include diagnosis (such as tuning an engine).

Table 1

Number and Percent (%) of "Valid" ISSOE Tasks

Unit No.	Number of Tasks	Number of "Valid" Tasks[1]	% of "Valid" Tasks	Comments	Independent Evaluator's "Agreements" No.	%
1	13	10	77%	Some "tasks" do no require student performance and some are unrelated to course per se.	12	92%
2	28	28	100%		27	96%
3	32	17	53%	Includes 15 "tasks" which are more correctly "duties" or functions, i.e., each contains other tasks.	32	100%
4	13	4	31%	Includes 9 "tasks" which are more correctly "duties" or functions, i.e., each contains other tasks.	11	85%
5	16	13	81%		14	88%
6	8	5	63%	Includes 3 "tasks" which are more correctly "duties" or functions, i.e., each contains other tasks.	8	100%
7	7	4	57%	Includes 3 "tasks" which are more correctly "duties" or functions, i.e., each contains other tasks.	7	100%
Total	117	81	69%		111	95%

[1]Task statements that require minor modifications are included. Recommended changes are listed in the report.

Review and Analysis of ISSOE Task List

Module Page ID No.	Task	Comment	Independent Evaluation Comments
	UNIT 1		
1-1-1 (01-01-01)[1]	Identify shop hazards	Valid.	Agree
1-2-2 (01-02-01)	Identify personal safety	Valid, however, add word "requirements" to make statement into logical task.	Safety requirements are not identified; they are determined. Hazards are identified.
1-3-3 (01-03-01)	Fill out job application	Valid, however, unrelated to course per se. Should be a separate section, perhaps on "getting a job."	Agree
1-4-4 (01-04-01)	Select personal goals	Not a task. Unrelated to course per se, except as an early block of instruction about the profession of automobile mechanics.	Agree. But could be related to task 1-3-3 and taught in "getting a job" block.
1-5-5 (01-05-01)	Identify, use and care (for) hand tools	Not a task as written. "Identify" is not a task, but a skill or knowledge. "Use" is not a task since tools are used for a purpose, not for their own sake. "Caring for" or "maintaining" tools <u>is</u> a task since it involves work done for its own sake.	Agree

[1]Numbers in parentheses represent ISSOE code numbers as of October 1978

Review and Analysis of ISSOE Task List

Module Page ID No	Task	Comment	Independent Evaluation Comments
1-6-6 (01-06-01)	Identify shop power equipment	Not a task. Student receives knowledge but does not perform work.	Agree
1-6-7 (01-06-02)	Lift vehicles	Valid. Note, however, that this will appear in other tasks (hence change in level of specificity).	Agree
1-7-8 (01-07-01)	Change engine oil and filter	Valid. But, requires an introductory "troubleshoot" task, otherwise, why is the work being performed?	Agree
1-7-9 (01-07-02)	Lubricate chassis	Valid.	Agree
1-8-10 (01-08-01)	Repack front wheel bearing	Valid.	Agree
1-9-11 (01-09-01)	Rotate tires	Valid.	Agree
1-9-12 (01-09-02)	Repair a leaking tire	Valid.	Agree, However, a tire can be repaired for reasons other than leakage.
1-9-13 (01-09-03)	Balance wheels	Valid.	Agree

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Module Page ID No.	Task	Comment	Independent Evaluation Comments
	UNIT 2	Unit 02 deals with chassis and frame. Troubleshooting and inspection tasks should be extracted and precede this unit.	Troubleshooting and inspection might follow more logical sequence if placed throughout this and subsequent sections --preceding individual components to be repaired, replaced, etc.
2-1-1 (02-01-01)	Remove & replace brake shoes	Valid.	Agree
2-1-2 (02-01-02)	Remove & replace parking brake cable	Valid.	Agree
2-2-3 (02-02-01)	Remove & replace disc brake caliper, pads & rotor	Valid.	Agree
2-3-4 (02-03-01)	Remove & replace brake lines	Valid.	Agree
2-3-5 (02-03-02)	Remove & replace wheel cylinder	Valid.	Agree
2-3-6 (02-03-03)	Remove & replace master cylinder	Valid.	Agree
2-3-7 (02-03-04)	Remove & replace power brake assist unit	Valid.	Agree
2-3-8 (02-03-05)	Remove & replace proportioning valve	Valid.	Agree

Module Page ID No.	Task	Comment	Independent Evaluation Comments
2-3-9 (02-03-06)	Overhaul a master cylinder	Valid.	Agree
2-3-10 (02-03-07)	Recondition wheel cylinder	Valid.	Agree
2-3-11 (02-03-08)	Overhaul disc brake caliper	Valid.	Agree
2-3-12 (02-03-09)	Machine brake drums and disc	Valid.	Agree
2-4-13 (02-04-01)	Remove & replace shock absorbers	Valid.	Agree
2-4-14 (02-04-02)	Measure standing height	Valid. However, to make statement accurate add .."of a car."	Agree
2-4-15 (02-04-03)	Check front end for wear	Valid.	Agree
2-4-16 (02-04-04)	Remove & replace front end linkage	Valid.	Agree
2-4-17 (02-04-05)	Remove & replace ball joints	Valid.	Agree
2-4-18 (02-04-06)	Remove & replace control arms	Valid.	Agree
2-4-19 (02-04-07)	Remove & replace coil springs	Valid.	Agree

Review and Analysis of ISSOE Task List

Module Page ID No.	Task	Comment	Independent Evaluation Comments
2-4-20 (02-04-08)	Remove & replace leaf springs	Valid.	Agree
2-4-21 (02-04-09)	Remove & replace torsion bar	Valid	Agree
2-5-22 (02-05-01)	Perform state inspection	Valid. Note that several steps involve performance tasks (raise, check, etc.) which provide "why" for related tasks and might precede them.	Since specific procedures are involved, this task is valid on its own.
2-6-23 (02-06-01)	Align front end	Valid.	Agree
2-7-24 (02-07-01)	Adjust pitman arm preload	Valid.	Agree
2-7-25 (02-07-02)	Check oil pressure	Valid. Note that student is not told why work is done.	Agree
2-7-26 (02-07-03)	Remove & replace power steering hose	Valid.	Agree
2-7-27 (02-07-04)	Remove & replace power steering pump	Valid.	Agree
2-7-28 (02-07-05)	Remove & replace steering box	Valid.	Agree

Review and Analysis of ISSOE Task List

Module Page ID No.	Task	Comment	Independent Evaluation Comments
	UNIT 3	Unit 03 includes several "tasks" which are more correctly "duties" or functions. Each contains other tasks.	Agree
3-1-1 (03-01-01)	Inspect and test : Inspect cooling system : Pressure test cooling system : Test coolant solution	Not a task as written. Major objectives (shown at left) are independent tasks.	Agree
3-1-2 (03-01-02)	Drain, flush & refill	May or may not be a task. The four major objectives: "drain," "refill," "clean," "flush," can stand as separate tasks although "drain & refill" forms a logical task. 3-2-1 is a task only if worker performs the entire action for its own sake.	Agree
3-1-3 (03-01-03)	Remove & replace minor parts	Not a task. Each major objective can stand along although two (R & R Radiator hose and R & R heater hose) form a logical task "remove & replace hoses."	Agree
3-1-4 (03-01-04)	Remove & replace major parts	Not a task. Major objectives are each performed independently. Note that other tasks (such as "remove & replace hoses") are "imbedded."	Agree

Review and Analysis of ISSOE Task List

Module Page ID No.	Task	Comment	Independent Evaluation Comments
3-2-5 (03-02-01)	Service carburetor	Valid. However, major objective "remove & replace carburetor" is a separate task independent of "servicing."	Agree
3-2-6 (03-02-02)	Overhaul carburetor-1 bbl	Valid.	Agree
3-2-7 (03-02-03)	Overhaul carburetor-2 bbl	Valid.	Agree
3-2-8 (03-02-04)	Overhaul carburetor-4 bbl	Valid.	Agree
3-3-9 (03-03-01)	Service fuel storage & delivery system	Major objectives and enabling objectives conflict. MO is a "test" procedure while EOs are "remove & replace," plus "test" and "fabricate." Each EO could probably stand as a separate task.	Agree
3-4-10 (03-04-01)	Service fuel injection system	Major objectives conflict with enabling objectives. If a true "system" exists then "test" is a valid task. The "remove & replace" (tank boost pump) or "replace" (main relay) EOs seem to be independent tasks.	Agree
3-5-11 (03-05-01)	Test primary ignition circuit	Valid if each major objective is normally performed together	Agree

Module Page ID No.	Task	Comment	Independent Evaluation Comments
3-5-12 (03-05-02)	Replace and/or adjust primary circuit components	As a minimum, "replace" and "adjust" are separate tasks. Enabling objectives may be separate tasks if performed for their own sake.	Agree. To be consistent with previous tasks, retitle "remove and replace."
3-5-13 (03-05-03)	Overhaul distributor	Valid.	Agree
3-6-14 (03-06-01)	Service ignition secondary components	Four "remove & replace" tasks are identified. EOs "relate" and "read" are task elements.	Agree
3-7-15 (03-07-01)	Perform minor tune-up	Valid but a broader level of specificity. There is overlap with 3-6-14.	Agree
3-7-16 (03-07-02)	Connect & program an analyscope	Valid	Agree
3-7-17 (03-07-03)	Diagnose an engine electronically	Valid but a bit broad in scope.	Agree
3-8-18 (03-08-01)	Select proper test equipment & diagnose autolite electronic ignition problems	Two tasks. "Select & connect" and "diagnose" stand alone. However, no indication as to how student knows what is proper test equipment.	Agree
3-8-19 (03-08-02)	Remove & replace components of autolite electronic ignition system	Valid if major objectives are done together. If not, there are 3 "remove and replace" tasks.	Agree

Review and Analysis of ISSOE Task List

Module Page ID No.	Task	Comment	Independent Evaluation Comments
3-8-20 (03-08-03)	Test components of Chrysler electronic ignition system	Valid	Agree
3-8-21 (03-08-04)	Test GM "HEI" distributor assembly and coil assembly	Valid	Agree
3-9-22 (03-09-01)	Remove & replace minor parts	Four tasks. "Inspect" & each "remove & replace" form separate measurable units of work.	Agree
3-9-23 (03-09-02)	Remove and replace Major parts	Each "remove & replace" is a separate task. An "inspect" task is missing. (see 3-9-22)	Agree
3-10-24 (03-10-03)	Identify and test emission controls	Valid	Agree. However, "identify" is skill or knowledge & we do not specify identification of parts in other tasks.
3-11-25 (03-11-01)	Service timing chain & camshaft	Although each step would be necessary to replace a camshaft, the 3 "remove & replace" actions can likely be independent tasks.	Agree
3-11-26 (03-11-02)	Service pistons and rings	Appears to be several complex & independent tasks. Those always performed together form single tasks.	Agree

Review and Analysis of ISSOE Task List

Module Page ID No.	Task	Comment	Independent Evaluation Comments
3-11-27 (03-11-03)	Remove & replace crankshaft	Assuming that all major objectives must be performed, this is a single valid task.	Agree
3-11-28 (03-11-04)	Machine the short block	There seem to be several separate tasks (remove & replace," "hone," "align," "recondition," "measure").	Agree
3-12-29 (03-12-01)	Remove & replace rocker arms	Valid. However, major objectives include "adjust" task which can be performed in its own right.	Agree
3-12-30 (03-12-02)	Remove & replace cylinder head	Valid. However, "remove & replace intake manifold" appears to be a task which can be performed in its own right. Why is this work performed?	Agree
3-12-31 (03-12-03)	Service cylinder head	Valid.	Agree
3-12-32 (03-12-04)	Machine & measure	Not a task as written. What is "machined & measured?" Major objectives seem to include several difficult and complex tasks.	Agree

Module Page ID No.	Task	Comment	Independent Evaluation Comments
	UNIT 4		
4-1-1 (04-01-01)	Test electrical systems	Contains two tasks - "testing" and "correction of malfunctions." The mechanic can test and find no deficiencies.	Agree. However, correcting malfunctions seems to be covered to some extent by subsequent tasks.
4-1-2 (04-01-01)	Remove & replace components of lighting system	Independent tasks dealing with lights, switches, etc. seems more appropriate. Switches form a "cluster" as do actions associated with lights and bulbs.	Agree
4-2-3 (04-02-01)	Start an engine using booster cables	Valid.	Agree
4-2-4 (04-02-02)	Service and test battery :test condition of ... :remove, clean, install cables :install battery :test condition of ... :charge battery :service battery (add electrolyte, etc.)	Several tasks (see left)	Agree. Though remove/install cables and Service (to include clean) cables could be separate tasks.
4-3-5 (04-03-01)	Test, remove & replace components of charging system	Several tasks. "Test"includes hookup, read, measure. Each remove & replace seems independent in its own right.	Agree

Module Page ID No.	Task	Comment	Independent Evaluation Comments
4-3-6 (04-03-02)	Test & overhaul auto motive alternator	At least two tasks (test & disassemble/reassemble). If unsoldered and soldered alternators require different proedures, then they are separate tasks as well.	Agree
4-4-7 (04-04-01)	Test, diagnose, remove & replace components of the starting system	Three tasks (test, diagnose & remove/replace) are detected.	Agree
4-4-8 (04-04-02)	Overhaul starter	Valid.	Agree
4-5-9 (04-05-01)	Test instruments	Valid.	Vague. Test of mechanical and electrical indicators could be separate tasks if procedures differ.
4-5-10 (04-05-02)	Remove & replace indicators	Valid.	Agree. May be two tasks.
4-6-11 (04-06-01)	Test, remove & replace defective components of power antenna	Minimum of 3 tasks. "Test" includes hookup, read, interpret. Remove & replace could be separate tasks if procedures differ. "Repair" appears as major objective and is distinctly a separate task.	Agree that 2 tasks are needed. However, if antenna is repaired only by replacement, inclusion of both actions is undesirable. One task (repair, or remove & replace) plus "test" is warranted.

Module Page ID No.	Task	Comment	Independent Evaluation Comments
4-6-12 (04-06-02)	Test, repair, adjust or replace components of power seats	Four tasks are evident in the original task title. Each requires separate procedures.	Agree
4-6-13 (04-06-03)	Test, repair or replace defective components of power windows	Test, repair, replace are separate tasks. Enabling objectives adds "adjust" which is generally imbedded in "repair."	Agree. For consistency, should read "remove and replace."
	UNIT 5		
5-1-1 (05-01-01)	Remove & replace universal joint	Valid.	Agree
5-1-2 (05-01-02)	Balance & correct angle of drive shaft	Valid.	Appears to be at least two separate tasks.
5-1-3 (05-01-03)	Remove & replace constant velocity joint	Valid.	Agree
5-2-4 (05-02-01)	Remove & replace differential assembly	Valid. Note that "raise & support car" is merely an element of the task.	Agree

Module Page ID No.	Task	Comment	Independent Evaluation Comments
5-2-5 (05-02-02)	Overhaul differential assembly	Valid. However, two types of differentials are indicated. If procedures are substantially different, there are two tasks.	Agree
5-2-6 (05-02-03)	Remove & replace axle & axle bearing & seal	Valid as written if both actions are routinely performed together.	Agree
5-2-7 (05-02-03)	Remove & replace axle & axle bearing	Distinct overlap with 5-2-6. Task is valid if procedures differ (in-housing vs. Chrysler).	Agree
5-3-8 (05-03-01)	Remove & replace clutch	Valid.	Agree
5-4-9 (05-04-01)	Remove & replace manual transmission	Valid. However, major objectives introduces "adjust" which can represent a separate task.	Agree
5-4-10 (05-04-02)	Overhaul manual transmission	If 3-4-5 speed procedures differ significantly then tasks are independent.	Agree
5-5-11 (05-05-01)	Remove & replace automatic transmission	Valid task if each enabling objective must be performed.	Agree
5-5-12 (05-05-02)	Overhaul transmission	Each enabling objective ("test," "overhaul," "remove & replace") is a separate task. Each appears to imply independent work procedures.	Agree

Module Page ID No.	Task	Comment	Independent Evaluation Comments
5-5-13 (05-05-03)	Remove & replace fluid, filter, seal & gasket	Valid.	Agree
5-5-14 (05-05-04)	Adjust bands	Valid. Suggest a complete task statement: Adjust automatic transmission bands.	Agree
5-5-15 (05-05-05)	Adjust linkage	Major objectives suggest different procedures for "console" and "column" types, thus separate tasks. Also see comment 5-5-14.	Agree
5-5-16 (05-05-06)	Pressure test transmission	Valid.	Agree
	UNIT 6		
6-1-1 (06-01-01)	Make minor exterior body adjustments on station wagon	At a minimum, there appears to be different procedures for doors and tailgates, thus separate tasks.	Agree. There could also be separate tasks for "alignment" and "removing and replacing" components.
6-1-2 (06-01-02)	Make windshield wiper repairs	Clearly 3 tasks, dealing with motors, transmission & linkage, and blades & inserts.	Agree
6-1-3 (06-01-03)	Make minor interior body adjustments	Title does not describe work performed. Major objectives must be examined to ascertain if they are independent tasks.	Agree

Review and Analysis of ISSOE Task List

Module Page ID No.	Task	Comment	Independent Evaluation Comments
6-1-4 (06-01-04)	Perform major door alignment	Valid. Note: is there a procedure for "minor" door alignment?	Agree
6-2-5 (06-02-01)	Perform necessary glass adjustment	There may be 3 independent tasks: "weather stripping...", "rear quarter windows...", & "door windows.." Note: word "necessary" in title as written suggests a task dealing with "unnecessary" adjustments.	Agree
6-3-6 (06-03-01)	Clean/polish interior surfaces	Valid.	Agree. Task should read "Clean/ polish car interior."
6-4-7 (06-04-01)	Clean/polish the exterior	Valid	Agree. Task should read "Clean/ polish car exterior."
6-4-8 (06-04-02)	Clean & treat vinyl top	Valid.	Agree
	UNIT 7		
7-1-1 (07-01-01)	Service & test heater	"Test," "repair," and "replace" are separate tasks (for example, a test may prove negative & effectively end the work process. "Adjustment" seems to be merely an element of the repair or replace process, not a separate work unit.	Agree

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Review and Analysis of ISSOE Task List

Module Page ID No.	Task	Comment	Independent Evaluation Comments
7-2-2 (07-02-01)	Test operation of air conditioner	Valid.	Agree
7-2-3 (07-02-02)	Evacuate & charge air conditioner	Valid.	Agree
7-2-4 (07-02-03)	Remove & replace (air conditioner) components	Valid. Note title change.	Agree
7-2-5 (07-02-04)	Overhaul air conditioner components	Valid.	Agree
7-3-6 (07-03-01)	Test & adjust speed control components	"Test & "adjust" are independent tasks. Further, if procedures differ, each type of speed control may produce separate tasks.	Agree
7-4-7 (07-04-01)	Test, repair or replace	Title must include object (defogger or defroster). Three tasks appear - test, repair, and replace.	Agree. Suggest task read "remove & replace" for consistency.

Comparison of ISSOE and V-TECS Task Lists

Review of the V-TECS catalog reveals a listing of tasks developed under basically the same set of standards described in the first section of this report.

Definitions of terms provided in the catalog and methods described for the development of the catalog reveal procedures virtually identical to those of the U.S. military departments which reflect techniques generally referred to as Instructional Systems Development (Campbell & Lindsey, 1979).

Computer analysis procedures, including software routines (time spent, percent performing, etc.) and standards for selecting or rejecting tasks (30 percent perform, etc.) are also virtually identical to U.S. military department procedures (Berger & Hawkins, 1979).

The comparison attempts to "detect" ISSOE tasks in the V-TECS catalog. Each ISSOE task was examined as originally written and/or as modified in the initial review and analysis conducted for this project. Similarities and differences are noted. For ease of recording, ISSOE and V-TECS tasks are identified by number. Modified or changed ISSOE tasks are appropriately identified.

Inspection of ISSOE and V-TECS materials reveals substantially different organization of the curriculum/catalog. ISSOE is organized into seven units (introduction, chassis, and frame, power plant, electrical, drive line, body mechanical, and accessories) while V-TECS is divided into twelve major automotive areas referred to as "duties." As will

be noted, the V-TECS procedure is more logical since it permits the training developer and analyst to group tasks which:

a. Represent a function generally recognized as one of the worker's principal responsibliities,

b. Represent a function occupying a reasonable portion of the worker's time,

c. Represent a function which occurs with reasonable frequency in the worker's work cycle, and most important

d. Represent work operations which are closely related to similar skills, knowledges, and abilities.

Unfortunately, the ISSOE units do not always pass such a test. For example, electrical systems are found in several units including "power plant" (e.g., electronic ignition), "electrical" (all modules), and "accessories" (e.g., speed control). Since many basic skills are required across these modules and the larger units, training or at least training management can be improved through use of the V-TECS method. A basically identical "task" organization has proved most successful in U.S. military department procedures. Notwithstanding the above argument, the question of which way is easiest to teach at the secondary level will have to be decided by the teachers as a function of their experience. Presumably, the teachers, who are the ISSOE developers, will move to the system that maximizes student learning in the most efficient way.

As in the first instance, an independent comparison and evaluation was conducted by an experienced occupational analyst. These findings were then compared to the original analyses. If disagreement was found or additional comments were believed relevant, they were provided. These data are presented in Table 2. Over three-fourths (77%) of the ISSOE tasks were included in the V-TECS listing. Overall agreement between the two analyses was 95% with % agreement for individual ISSOE units ranging

Table 2

Number and Percent of ISSOE Tasks Included in V-TECS Task List

ISSOE Unit No.	Number of Tasks	Number of ISSOE Tasks included in V-TECS	% of ISSOE Tasks Included in V-TECS	Number of ISSOE Tasks Partitioned into more than one V-TECS Task[3]	Comments	Independent Evaluation Agreements	
						No.	%
1	13[1]	8[2]	62%	8	This unit deals with tasks and knowledge required by a beginning student and an experienced gas station employee. They do not seem to form a meaningful unit for automotive training.	13	100
2	28	23	82%	14	This unit crosses 3 V-TECS duty areas: power steering, braking systems, & front ends. Several related V-TECS tasks from these 3 duties also in ISSOE unit 1. Several V-TECS tasks receive only superficial coverage in ISSOE.	25	89
3	32	30	94%	17	Unit 3 crosses 5 V-TECS duty areas: overhaul, power trains, electrical systems, fuel systems, & cooling systems. Several ISSOE tasks are addressed in multiple V-TECS tasks. Nearly a dozen V-TECS tasks which are closely related to "power plant" (although many seem "electrical") are omitted.	30	94

(continued)

Table 2 (continued)

Number and Percent of ISSOE Tasks Included in V-TECS Task List

ISSOE Unit No.	Number of Tasks	Number of ISSOE Tasks included in V-TECS	% of ISSOE Tasks Included in V-TECS	Number of ISSOE Tasks Partitioned into more than one V-TECS Task[3]	Comments	Independent Evaluation Agreements	
						No.	%
4	13	9	69%	4	ISSOE unit 4 is contained in a single V-TECS duty area, electrical systems. That duty area, however, contains 34 tasks while the ISSOE unit includes only 13 tasks. As noted earlier, numerous ISSOE "electrical" related tasks are found in other units.	13	100
5	16	13	81%	9	Unit 5 includes tasks from 2 V-TECS duty areas: power trains and automatic transmissions. In comparison to V-TECS, some ISSOE tasks are literally duties, or at least very non-specific tasks.	16	100
6	8	1	13%	1	For all practical purposes, V-TECS does not include the content of this unit. While this might seem reasonable in regard to "appearance" items, items pertaining to adjustment of doors and windows or other hardware seem relevant to automotive maintenance.	7	88

(continued)

Table 2 (continued)

Number and Percent of ISSOE Tasks Included in V-TECS Task List

ISSOE Unit No.	Number of Tasks	Number of ISSOE Tasks included in V-TECS	% of ISSOE Tasks Included in V-TECS	Number of ISSOE Tasks Partitioned into more than one V-TECS Task[3]	Comments	Independent Evaluation Agreements	
						No.	%
7	7	6	86%	6	With one exception, this unit includes tasks from only two duty areas: air conditioners and heaters. The exception is 7-3-6 which is an electrical item. Only 3 V-TECS tasks could not be identified in ISSOE	7	100
Total	117	90	77%	59		111	95%

[1]The October 1978 ISSOE materials added two new tasks that dealt with the use of Oxyacetylene torch.

[2]Some of the excluded ISSOE tasks are meant for very naive beginning students who typically are found in first semester courses at the secondary school level.

[3]Components from many ISSOE tasks exist as separate V-TECS POs. Some ISSOE tasks are incorporated into a large number of V-TECS tasks. ISSOE 1-7-9 which corresponds to V-TECS 194-196 is an example of the former while ISSOE 1-1-1, safety, is an example of the latter.

from 88% to 100%. As noted in Table 2, a large number of ISSOE tasks that are included in V-TECS (59 out of 90 or 66%) are contained in more than one V-TECS performance objective or task.

For teaching purposes, a task breakdown such as presented in V-TECS is probably preferrable. The training developer must divide each task into some smaller unit which may be referred to as an "element," "performance guide," "major or enabling objective," or simply the "how" steps. Training must also be grouped in some logical manner (such as the V-TECS duties) which will afford continuity to the teaching process and permit the student to see the job unfold as learning is acquired. ISSOE is <u>not</u> unsatisfactory, rather it must be looked upon as an interim step in the analysis required to develop a more useful training catalog/course.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
1-1-1 (01-01-01)	None. Safety included in each task.	Agree
1-2-2 (01-02-01)	None. Safety included in each task.	Agree
1-3-3 (01-03-01)	None.	Agree
1-4-4 (01-04-01)	None.	Agree
1-5-5 (01-05-01)	None. Included in each task (NOTE: each ISSOE task also refers to proper tools).	Agree
1-6-6 (01-06-01)	None.	Agree
1-6-7 (01-06-02)	Not taught as separate task.	Agree
1-7-8 (01-07-01)	Not taught as separate task. Related to PO 17	Agree
1-7-9 (01-07-02)	PO 194 - 196. Appears in "front ends" rather than "introduction - lubrication."	Agree

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
1-8-10 (01-08-01)	PO 188 and 189. Also related to PO 200 which does not appear as a separate task in ISSOE.	Agree
1-9-11 (01-09-01)	None.	Agree
1-9-12 (01-09-02)	None.	Agree
1-9-13 (01-09-03)	PO 190.	
	Comment: ISSOE unit 01 appears to deal with tasks which might be performed by an inexperienced gas station employee. They do not seem to form a meaningful unit for automotive training.	Agree
* 2 new ISSOE TASKS		
(01-10-01)	Use torch to heat metal for shaping	
(01-10-02)	Cut metal with torch	

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
2-1-1 (02-01-01)	PO 160, 170, 171, 178. V-TECS "lowers" level of specificity & divides work into four tasks.	Agree. Also relates to PO 163.
2-1-2 (02-01-02)	PO 161, 164, 184. Note differing terminology (cable vs. linkage).	Agree.
2-2-3 (02-02-01)	PO 165.	Agree. Also relates to PO 166.
2-3-4 (02-03-01)	PO 163, 177.	Agree.
2-3-5 (02-03-02)	PO 163, 176, 183. Note overlap with 2-3-4.	Agree.
2-3-6 (02-03-03)	PO 173, 182. Note that V-TECS separates "repair" and "replace" into two tasks.	Agree. Also relates to PO 163.
2-3-7 (02-03-04)	PO 174, 181. Again, two tasks, "rebuild.. unit" and "replace.. cylinders."	Agree. Also relates to PO 182.
2-3-8 (02-03-05)	PO 179. Differing terminology.	Agree. Also relates to PO 163, 177.
2-3-9 (02-03-06)	None. "overhaul" of master cylinder not included in V-TECS.	Agree.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
2-3-10 (02-03-07)	None. Not included in V-TECS.	Agree, but partially covered in PO 163.
2-3-11 (02-03-08)	PO 172.	Agree. Also relates to PO 163.
2-3-12 (02-03-09)	PO 159, 166, 167. Divided into three tasks.	Agree.
2-4-13 (02-04-01)	PO 201.	Disagree. PO 203.
2-4-14 (02-04-02)	None. Not included as V-TECS task.	Agree.
2-4-15 (02-04-03)	PO 193, 196. V-TECS considers "defective" and "improper" suspension as separate tasks.	Agree.
2-4-16 (02-04-04)	Not identified in V-TECS. May be due to differing terminology.	Agree.
2-4-17 02-04-05)	PO 199.	Agree.
2-4-18 (02-04-06)	PO 201.	Agree.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
2-4-19 (02-04-07)	PO 198, 202. Note that V-TECS tasks show some degree of overlap. POs should be reviewed.	Agree.
2-4-20 (02-04-08)	PO 198, 202. Note overlap with 2-4-19. It seems reasonable to make distinction between coil & leaf springs. V-TECS does not.	Agree.
2-4-21 (02-04-09)	PO 186.	Agree. Also relates to PO 187
2-5-22 (02-05-01)	None. NY State inspection is a unique requirement involving variety of procedures.	Agree.
2-6-23 (02-06-01)	PO 191.	Agree.
2-7-24 (02-07-01)	Possibly PO 153, 192. Terminology differs substantially.	Could relate to PO 142.
2-7-25 (02-07-02)	PO 142, 143. ISSOE task relates to power steering units but is not specifically included in V-TECS.	Relates to PO 155.
2-7-26 ((02-07-03)	PO 148. (Included in V-TECS "adjust" "rebuild.")	Agree. Also could relate to PO 149, 156, 158.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
2-7-27 (02-07-04)	Appears in PO 148, 150, 155, 156 157, 158. V-TECS considers this operation to be several independent tasks. (Differing level of specificity).	Agree. Also relates to PO 149.
2-7-28 (02-07-05)	Involves PO 145, 148, 154. V-TECS considers "inspect," "adjust-rebuild," and "replace" as separate tasks.	Agree.
	Comment: ISSOE unit 02 crosses three V-TECS duty areas: power steering, braking systems, and front ends. Several related V-TECS tasks from these three duties also appear in ISSOE unit 01. V-TECS organization appears better. Note that several V-TECS tasks receive only superficial coverage in ISSOE. Some relationships are "best choice" rather than "ideal."	Agree.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
3-1-1 (03-01-01)	PO 126, 127, 128, 131, 132. V-TECS various checks and tests as separate tasks. ISSOE considers all as a single task. V-TECS is preferred.	Agree.
3-1-2 (03-01-02)	PO 129. Both ISSOE & V-TECS include only a single task here. Review & analysis of ISSOE recommended multiple tasks.	Agree.
3-1-3 (03-01-03)	PO 130, 135, 136, 137, 140, 141. Clearly the several V-TECS tasks are preferred.	Agree.
3-1-4 (03-01-04)	PO 133, 138. V-TECS POs 134 & 139 are directly related. They do not appear in ISSOE.	Agree.
3-2-5 (03-02-01)	PO 114, 115, 116, 118, 124. V-TECS identifies several independent tasks. Several related procedures do not appear in ISSOE.	Agree.
3-2-6/7/8 (03-02-02 03 04	PO 111. V-TECS does not distinguish between carburetor types.	Agree. Also relates to PO 114, 115.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
3-3-9 (03-03-01)	PO 109, 110, 112, 113, 119, 122, 123. Each V-TECS task stands alone. PO 125 is related but not included in ISSOE.	Agree.
3-4-10 (03-04-01)	Not identified in V-TECS.	Agree.
3-5-11 (03-05-01)	PO 81, 82. V-TECS divides "primary circuit" into two groups. ISSOE may be a bit broad.	Agree.
3-5-12 (03-05-02)	PO 81, 82, 96, 100, 103. Clearly several tasks.	Agree with PO 96, 100, 103. In the purest sense, PO 81, 82 do not directly relate to this task since they are "inspect" tasks, rather than "replace/ adjust" tasks. These test & inspect actions are included in ISSOE 3-5-11. Also relates to PO 94.
3-5-13 (03-05-03)	PO 84, 94. V-TECS recognizes "replace" and "adjust" distributors as separate from "overhaul."	Agree.
3-6-14 (03-06-01)	PO 80. V-TECS includes only "inspect." All secondary component tasks imbedded in 3-6-14 are missing from V-TECS.	Agree. Also relates to PO 78.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
3-7-15 (03-07-01)	Appears in PO 78, 103, 104, 108. Note ISSOE overlap with 3-6-14	Agree. Also relates to PO 100.
3-7-16 (03-07-02)	PO 75. V-TECS deals with use rather than connection & programming of scope. It is presumed that V-TECS includes instruction in use of scope.	Agree.
3-7-17 (03-07-03)	PO 75, 79. V-TECS does not specifically note use of analyscope.	Agree.
3-8-18 (03-08-01)	PO 107 appears closest. Note that V-TECS and ISSOE should both be two tasks (in other words, each is too broad, although different).	Agree.
3-8-19/20 (03-08-02 03	PO 107. V-TECS does not focus on specific manufacturer's equipment.	Agree.
3-8-21 (03-08-04)	Not identified in V-TECS.	Agree.
3-9-22 (03-09-01)	PO 10, 23, 27. V-TECS does not include a task pertaining to exhaust pipes. Tasks are related but independent work.	Agree.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
3-9-23 (03-09-02)	PO 12, 125. ISSOE apparently mixes fuel systems and engine overhaul. Catalytic converters are not mentioned in V-TECS.	Agree.
3-10-24 (03-10-03)	PO 120, 121. V-TECS divides emission control into two systems: exhaust & evaporative. Decision is technical since tasks are supportable either way.	Agree.
3-11-25 (03-11-01)	Included in PO 22 although not described in precisely the same manner. Balance of PO not included in ISSOE.	Agree.
3-11-26 (03-11-02)	Generally covered by PO 7, 25, 26. ISSOE organization seems inferior.	Agree.
3-11-27 (03-11-03)	PO 9. V-TECS should be several tasks.	Agree.
3-11-28 (03-11-04)	One portion covered by PO 19.	Agree.
3-12-29 (03-12-01)	PO 2, 28. Latter PO should certainly be divided into several tasks.	Agree.
3-12-30 (03-12-02)	Appears in PO 5, 6, 11. ISSOE is deficient, should include inspection as well.	Agree. Although PO 11, as an "inspect" task, does not identify replacement procedures.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
3-12-31 (03-12-03)	Can be found to relate to PO 4, 5, 8, 19, 28. ISSOE may stand alone, however, V-TECS is more related to specific problems.	Agree.
3-12-32 (03-12-04)	PO 19 is best match.	Agree.
	Comment: ISSOE unit 03 crosses five V-TECS areas overhaul, power trains, electrical systems, fuel systems, and cooling systems. Several ISSOE tasks are addressed in multiple V-TECS tasks. Nearly a dozen V-TECS tasks which are closely related to "power plant" (although many seem "electrical") are omitted. Specifically: 13/14/15 - tests/diagnostics; 18 - removing vehicle from engine; 20 - engine mounts; 21 - flywheels; 24 - oil pumps; 76 - electrical fires; 77 - cranking malfunctions; 83 - electrical shorts; 139 - repairing radiator leaks. Technical comparisons are necessary to insure that task coverage is consistent. Task terminology remained compatible in most cases.	Agree.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
4-1-1 (04-01-01)	PO 85. PO 97 is related but not included in ISSOE.	Agree.
4-1-2 (04-01-01)	PO 73, 74, 89, 90.	Agree.
4-2-3 (04-02-01)	Not included in V-TECS.	
4-2-4 (04-02-02)	PO 102. Note that both ISSOE & V-TECS should be divided into separate tasks.	Agree.
4-3-5 (04-03-01)	PO 86, 87, 98. V-TECS includes "repair." ISSOE should be several tasks.	Agree.
4-3-6 (04-03-02)	PO 87. V-TECS task is only part of ISSOE.	Agree.
4-4-7 (04-04-01)	PO 91, 92, 101. ISSOE should also consider PO 99 which is not included in ISSOE.	Agree.
4-4-8 (04-04-02)	PO 92, 99.	Agree.
4-5-9 (04-05-01)	PO 106. V-TECS includes "rewiring."	Agree.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
4-5-10 (04-05-02)	PO 106	Agree.
4-6-11 (04-06-01)	Not included in V-TECS.	Agree.
4-6-12 (04-06-02)	Not included in V-TECS.	Agree.
4-6-13 (04-06-03)	Not included in V-TECS.	Agree.
	Comment: ISSOE unit 04 is contained in a single V-TEC duty area, electrical systems. That duty area, however, contains 34 tasks while the ISSOE unit includes only 13 tasks. As noted earlier, numerous ISSOE "electrical" related tasks are found in other units. Training management predicates a better concentration than is found in ISSOE. Many ISSOE tasks were found in more than one V-TECS task. ISSOE level of specificity was not standardized.	Agree.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
5-1-1 (05-01-01)	PO 42. V-TECS includes PO 33 (inspect) and PO 36 (lubricate) not included in ISSOE.	Agree.
5-1-2 (05-01-02)	Not included in V-TECS.	Agree.
5-1-3 (05-01-03)	Not included in V-TECS (note: terminology may differ thus precluding identification)	Agree.
5-2-4 (05-02-01)	PO 40, which includes "repair." V-TECS also includes PO 32 (diagnosis) and PO 41 (spider gear replacement) not in ISSOE.	Agree.
5-2-5 (05-02-02)	PO 48 is directly related. ISSOE task also to PO 40, 41. "Overhaul" is not specifically included in V-TECS.	Agree.
5-2-6 (05-02-03)	PO 43, 50 are related. V-TECS emphasizes "repair."	Agree. Also relates to PO 44.
5-2-7 (05-02-03)	Overlaps 5-2-6. V-TECS does not differentiate between manufacturers.	Agree.
5-3-8 (05-03-01)	PO 30, 31, 45, 52 are related. Each V-TECS task is included in ISSOE task.	Agree.
5-4-9 (05-04-01)	PO 29, 46, 47.	Agree.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
5-4-10 (05-04-02)	Related to 5-4-9. V-TECS does not differentiate between 3,4,5 speed transmissions.	Agree.
5-5-11 (05-05-01)	PO 37, 55, 61, 64, 68.	Agree. Also relates to PO 56, 57, 66, 69.
5-5-12 (05-05-02)	PO 37, 61, 63, 64, 67.	Agree. But relates to PO 62, 66.
5-5-13 (05-05-03)	PO 61, 63, 64, 69, 72.	Agree.
5-5-14 (05-05-04)	PO 65	Agree.
5-5-15 (05-05-05)	PO 56, 57	Agree. Also relates to PO 55.
5-5-16 (05-05-06)	Not included in V-TECS.	Agree.
	Comment: ISSOE unit 05 includes tasks from two V-TECS duty areas: power trains and automatic transmissions. Degree of overlap in ISSOE varies widely. In comparison to V-TECS, some ISSOE tasks are literally duties, or at least very non-specific tasks. Fifteen V-TECS tasks (PO 31, 32, 34, 35, 36, 47, 49, 51, 53, 54, 58, 59, 60, 70, 71) were either not identified as ISSOE tasks or could only be inferred through nature of ISSOE tasks.	Agree.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
6-1-1 (06-01-01)	None	Agree.
6-1-2 (06-01-02)	PO 1, 93. V-TECS tasks should probably be separated into independent tasks. This applies to 6-1-2 as well.	Agree.
6-1-3 (06-01-03)	None.	Agree.
6-1-4 (06-01-04)	None.	Agree.
6-2-5 (06-02-01)	None.	Agree.
6-3-6 (06-03-01)	None.	Agree.
6-4-7 (06-04-01)	None. Closest is PO 3, dealing with steam cleaning engines.	Cleaning of exterior chrome & paint is different function than cleaning engine.
6-4-8 (06-04-02)	None.	Agree.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
	Comment: For all practical purposes, V-TECS does not address this unit. While this might seem reasonable in regard to "appearance" items, items pertaining to adjustment of doors and windows or other hardware seem relevant to automotive maintenance and should probably appear. Regardless, the ISSOE items need to be broken down to separate work tasks.	Agree.
7-1-1 (07-01-01)	PO 211, 223, 224, 225, 226, 227, 228. This single ISSOE task include an entire V-TECS duty (maintaining and repairing automobile heaters) plus part of another task (PO 211). It is obviously composed of many independent tasks.	Agree.
7-2-2 (07-02-01)	PO 204, 208.	Agree.
7-2-3 (07-02-02)	PO 205, 206, 208.	Agree. Also relates to PO 207.
7-2-4 (07-02-03)	PO 211, 213, 214, 215, 218, 219, 220, 221. In addition, PO 207, 217, 222 could be associated with this ISSOE task although they are not included in ISSOE. Again, ISSOE could conceivably be easily divided into separate units for teaching purposes.	Agree. Also relates to PO 210, 212.

ISSOE - V-TECS COMPARISON

Module Page ID Number	Comments & V-TECS Performance Objective (PO) Number	Independent Evaluation Comments
7-2-5 (07-02-04)	PO 210, 216. In addition, PO 212 is associated although not identified in ISSOE.	Agree.
7-3-6 (07-03-01)	PO 105.	Agree.
7-4-7 (07-04-01)	None.	Agree.
	Comment: With one exception, unit 07 includes tasks only from two duty areas: air conditioners and heaters. The exception is 7-3-6 which is an electrical item. Although level of specificity is very poor, coverage is about equal. Only three V-TECS tasks could not be identified in ISSOE. V-TECS did not include tasks pertaining to defoggers and defrosters. This may be considered a V-TECS deficiency.	Agree.

Comparison of ISSOE to DOD (U.S. Army) Listing

The instrument used for comparison to ISSOE is the US Army Occupational Data Bank (now known as the Army Occupational Survey Program) enlisted survey questionnaire for specialty 63B, Wheel Vehicle Mechanic. The Army questionnaire is used to collect occupational data from job incumbents. Data are checked for accuracy and processed through a series of analytic computer programs (Berger & Hawkins, 1979) known as (CODAP) the Comprehensive Occupational Data Analysis Programs to produce a wide variety of report formats used by management and training analysts who work toward improving job structures, assignment and use of personnel, training, etc. Data collected by survey are used in the early stages of the Instructional Systems Development (Campbell & Lindsey, 1979) process used by all the military departments.

Army surveys consist of multi-part questionnaires which include a background section, a task section, an equipment section, a special requirements section, and a section for hand-written comments. Recently, a separate job/career satisfaction section has been added.

The 63B questionnaire included 633 tasks divided into eighteen duty areas. Since the questionnaire covers all military grades and levels of skill, and attempts to account for approximately 100% of the soldiers work time, duties included go beyond traditional mechanic task areas. In addition, the Army 63B also operates wreckers and generators, and performs maintenance on diesel as well as gasoline engines. Maintenance administration, supervision, and shop management duties are included in the questionnaire. It must also be noted that the 63B questionnaire is entirely oriented toward military rather than civilian vehicles.

The following "duties" are considered pertinent to the ISSOE - Army comparison:

Gas & diesel engine maintenance
Gas & diesel fuel systems maintenance
Gas & diesel engine cooling systems maintenance
Gas & diesel engine electrical systems maintenance
Power train component maintenance
Brake maintenance
Steering systems maintenance
Spring & shock absorber maintenance
Body/cab/frame/towing attachment maintenance

In addition to the above delimitation, the comparison stressed only those tasks which were actually performed by 50% or more of the 63B level soldiers. This cutoff, although somewhat arbitrary, was considered reasonable in terms of work tasks usually assigned to beginning workers. Appendix A shows a copy of a portion of a CODAP printout indicating "percent of members performing" and "percent time spent" that includes the 132 tasks that account for 50% or more of the soldiers.

All but <u>six</u> of these 132 tasks that accounted for 50% of the entry level 63B soldiers were found in the nine duties listed above. Of those six, three were general military tasks (firing or caring for weapons, etc.) one dealt with recording equipment deficiencies on a worksheet, and the last two were concerned with driving 1/4 ton or 2 1/2 ton vehicles.

Data from occupational surveys are one source of information used to develop soldier training. Soldier's Manuals, a series of official Army publications prepared for each occupational specialty, and within the specialty for each of the five "skill levels" are another source of such information. The Soldier's Manual describes the tasks the soldier must know and provides a situation, condition, performance measures,

standards, a list of necessary equipment and study references pertaining to each task. Disregarding the basic soldier tasks (weapon proficiency, map reading, first aid, etc.), the entry level and junior supervisor level Wheel Vehicle Mechanic are expected to master tasks in the following areas:

Administration (preparing forms, using manuals, maintaining tool kit, locating stock numbers)
Maintenance of engines & ignition systems
Maintenance of cooling systems
Maintenance of fuel systems
Maintenance of air induction & exhaust systems
Maintenance of electrical systems
Maintenance of power trains & components
Maintenance of brake systems
Maintenance of steering systems
Maintenance of suspension systems
Maintenance of cranes and winches

Appendix B is a copy of the tasks included in these 11 areas.

Of 135 tasks included in this Soldier's Manual, all but nine are considered maintenance technical tasks (those nine are in the Administration section).

The similarities between "duty" areas of the occupational survey questionnaire and the Soldier's Manual are obvious. The major difference is a lack of items in the survey questionnaire pertaining to exhaust systems.

As with the V-TECS listing this comparison attempts to "detect" ISSOE tasks in the occupational survey task list and in the 63B Soldier's Manual. Similarities and differences are noted and any ISSOE task included in either Army document as a skill or knowledge item is appropriately identified. ISSOE tasks are identified by number and Army items are referenced by source; Q - survey questionnaire, SM - Soldier's Manual, and number. The tasks which fall into the "50% or greater perform"

group are identified by a number in parentheses which indicates position in that group of tasks from 1 to 132. Other tasks are also shown in the body of the comparison but are excluded from Table 3 which summarizes these data.

Table 3

Number of ISSOE Tasks Included in Army Survey Questionnaire and Soldier's Manual

Unit	Number ISSOE Tasks	Number of Tasks[1] in Survey Questionnaire	Number of Tasks[2] in Soldier's Manual
1	13	6	4
2	28	20	39
3	32	37	31
4	13	30	7
5	16	8	7
6	8	2	1
7	7	0	0
	117	103	89

[1]Survey questionnaire items that occur more than once in ISSOE:

1. Item 8 (G48), 12 (G50), 15 (G51), 24 (G49), overlap in units 1 and 5.
2. Item 31 (H15) occurs in units 2 and 3.
3. Items 44 (D12) and 81 (F38) occur twice in unit 3.
4. Items 18 (F62) and 83 (F63) occur twice in unit 4.

[2]The number of distinct non-overlapping tasks in units 1-7 are respectively 3,35,25,6,7,1,0 or a total of 77.

When one considers that the ISSOE task list was developed for high school or post high school vocational training, while the Army questionnaire and Soldier's Manual reflect military (i.e., "combat") requirements, the similarity is remarkable in terms of coverage. A total of 95 of the 132 questionnaire items or 72% representing 50% of the actual work time of Army Wheel Vehicle Mechanics could be "detected" in the ISSOE task list. The percentage of DOD tasks detected in the ISSOE task list increases to 75% when the three military and three driving tasks are removed from the comparison. Of the 135 "critical/must know" tasks found in the technical portion of the Soldier's Manual, 78 (58%) were "detected" in the ISSOE task list. When the 18 tasks in the Soldier's Manual dealing strictly with cranes and winches and with military procedures such as logistics management and supply are deleted, the similarity is even more evident as the percent of DOD tasks in the ISSOE list goes up to 66%.

It should be noted that the military 63B is not involved in overhaul and rebuilding of automotive equipment. The 63B normally functions at the unit level wherein time, equipment and operational conditions do not permit such work to be accomplished. As a result, the 63B identifies defects, repairs those things identified for his level of skill, and replaces those parts or components which do not require major commitment of time or equipment. The overhaul and rebuild function is accomplished by persons in occupational specialty 63H, Automotive Repairman. The 63H specialty was felt to contain tasks beyond the scope of entry level civilian employees and thus was excluded from this comparison.

Comparison of ISSOE Tasks to Department of Defense Survey Questionnaire . Soldier's Manual Tasks

ISSOE	Questionnaire (Q)	Soldier's Manual (SM)
1-1-1 (01-01-01)	None. See knowledge items B6, B7	Inherent in all tasks
1-2-2 (02-01-01)	Same as 1-1-1	Same as 1-1-1
1-3-3 (01-03-01)	None	None
1-4-4 (01-04-01)	None	None
1-5-5 (01-05-01)	None. See knowledge item B11	1360
1-6-6 (01-06-01)	None. See knowledge item B15	1360
1-6-7 (01-06-02)	None	None
1-7-8 (01-07-01)	C22 (37), C23 (14)	1412
1-7-9 (01-07-02)	None. See skill item C5	None
1-8-10 (01-08-01)	G48 (8), G49 (24), G50 (12), G51 (15), G60, G61 G62, G63, G64	1525
1-9-11 (01-09-01)	P14	None
1-9-12 (01-09-02)	None. Duty "O" deals with tire repair but at a more complex level. Also see knowledge items B19-24.	None
1-9-13 (01-09-03)	None	None
2-1-1 (02-01-01)	G65 (42), G66 (19), H11 (25), H12 (34), H3 (36), H1 (45)	1544, 1545, 1546, 1548 1550, 1557, 1560

Comparison of ISSOE Tasks to Department of Defense Survey Questionnaire and Soldier's Manual Tasks (continued)

ISSOE	Questionnaire (Q)	Soldier's Manual (SM)
2-1-2 (02-01-02)	H8 (4), H9 (27), H21 (38), H22	1547, 1559
2-2-3 (02-02-01)	None	None
2-3-4 (02-03-01)	H17 (47) H18	None
2-3-5 02-03-02)	H15 (31), H16 (2)	1555, 1556
2-3-6 (02-03-03)	H13 (30), H14 (68)	1553
2-3-7 (02-03-04)	None	None
2-3-8 (02-03-05)	None	None
2-3-9 (02-03-06)	None	None
2-3-10 (02-03-07)	None	None
2-3-11 (02-03-08)	None	None
2-3-12 (02-03-09)	None	None
2-4-13 (02-04-01)	K16	1616
2-4-14 (02-04-02)	None	None
2-4-15 (02-04-03)	Duty K "troubleshoot" tasks 1-7, Duty I "troubleshoot" tasks, 17 (112)	1613, 1614
2-4-16 (02-04-04)	I12, I14, I20, I21	1583
2-4-17 (02-04-05)	K17	1617

Comparison of ISSOE Tasks to Department of Defense Survey Questionnaire and Soldier's Manual Tasks (continued)

ISSOE	Questionnaire (Q)	Soldier's Manual (SM)
2-4-18 (02-04-06)	Duty I	None
2-4-19 (02-04-07)	K1 (109), K3 (132), K7 (110), K8-15	1624
2-4-20 (02-04-08)	Same as 2-4-19	1621, 1622, 1625, 1626, 1627
2-4-21 (02-04-09)	None	None
2-5-22 (02-05-01)	M31, M32 (116), M35 P5, P7, P8, H7 (20)	1490, 1544, 1613
2-6-23 (02-06-01)	I28	1579, 1580, 1584
2-7-24 (02-07-01)	I15	1587
2-7-25 (02-07-02)	None	None
2-7-26 (02-07-03)	I23	1596
2-7-27 (02-07-04)	I24, I25, I26	1596
2-7-28 (02-07-05)	I15, I18, I19, I22	1581, 1583, 1585, 1586, 1587, 1588, 1589

Note: Questionnaire includes tasks for variety of wheeled vehicles while Soldier's Manual is generally restricted to 1/4 ton, 1 & 1/4 ton, and 2 & 1/2 ton vehicles. MOS 63B is generally restricted to tasks performed at the "unit" level. Overhaul and rebuild operations are conducted at a higher level of maintenance (direct or general support level) by Automotive Repair Specialists who have greater technical skills.

3-1-1 (03-01-01)	Duty E "troubleshoot" tasks including E1 (84) and E5 (87), also E12 (32)	1432
3-1-2 (03-01-02)	E11 (100)	None

Comparison of ISSOE Tasks to Department of Defense Survey Questionnaire and Soldier's Manual Tasks (continued)

ISSOE	Questionnaire (Q)	Soldier's Manual (SM)
3-1-3 (03-01-03)	E14 (5), E16 (96), E22 (6), E23 (3), E15 (90)	None
3-1-4 (03-01-04)	E13 (26), E21 (114)	1433, 1434
3-2-5 (03-02-01)	D12 (44), D13 (51), D48 (60), D49 (105)	1446, 1447, 1448, 1467, 1468, 1469
3-2-6 (03-02-02)	None	None
3-2-7 (03-02-03)	None	None
3-2-8 (03-02-04)	None	None
3-3-9 (03-03-01)	Duty I "troubleshoot" tasks including D1 (48) and D5 (75), also D11 (91), D14 (79), D15 (89), D20 (127), D21 (55), D22 (72), D27, D28 (46), D29 (62), D30 (131), D53, D54	1452, 1453, 1454, 1455 1456
3-4-10 (03-04-01)	None	None
3-5-11 (03-05-01)	F27, F35 (102)	1401, 1402, 1403, 1404
3-5-12 (03-05-02)	F36 (73), F37 (78), F38 (81), F39 (29)	1405, 1406, 1407
3-5-13 (03-05-03)	None	None
3-6-14 (03-06-01)	F38 (81), F40 (17), F41 (28), F42 (10), F43 (53)	1405, 1406
3-7-15 (03-07-01)	D12 (44). See knowledge item B9	1407, 1446, 1447
3-7-16 (03-07-02)	None. See knowledge items B8 and B12	None

Comparison of ISSOE Tasks to Department of Defense Survey Questionnaire and Soldier's Manual Tasks (continued)

ISSOE	Questionnaire (Q)	Soldier's Manual (SM)
3-7-17 (03-07-03)	Same as 3-7-16	1402
3-8-18 (03-08-01)	None	None
3-8-19 (03-08-02)	None	None
3-8-20 (03-08-03)	None	None
3-8-21 (03-08-04)	None	None
3-9-22 (03-09-01)	None	1470, 1471
3-9-23 (03-09-02)	C19, C24	1413
3-10-24 (03-10-03)	None	None
3-11-25 (03-11-01)	None	None
3-11-26 (03-11-02)	C15, C17, C18	None
3-11-27 (03-11-03)	None	None
3-11-28 (03-11-04)	None	None
3-12-29 (03-12-01)	C20, C21 (94)	1411
3-12-30 (03-12-02)	C16, C19	None
3-12-31 (03-12-03)	None	None

Comparison of ISSOE Tasks to Department of Defense Survey Questionnaire and Soldier's Manual Tasks (continued)

ISSOE	Questionnaire (Q)	Soldier's Manual (SM)
3-12-32 (03-12-04)	None	None

Note: As in Unit 02, overhaul and rebuild tasks are not detected in Q or SM.

4-1-1 (04-01-01)	Duty F "troubleshoot" tasks including F1 (56), and F5 (63), also F50 (11)	1496, 1497
4-1-2 (04-01-01)	F44 (65), F45 (40), F46, F47 (82), F48 (99), F49 (117), F51 (9), F52 (80), F53 (123)	Same as 4-1-1
4-2-3 (04-02-01)	None	None
4-2-4 (04-02-02)	F60 (7), F61 (13), F62 (18), F63 (83),	1489, 1495
4-3-5 (04-03-01)	F12 (85), F13 (111), F14 (21), F15, F16 (76), F17 (22), F18 (16), F19 (33), F22 (119), F23 (64), F24 (126)	1491, 1495, 1501
4-3-6 (04-03-02)	None	None
4-4-7 (04-04-01)	F25 (106), F26 (69), F27, F28, F62 (18), F63 (83)	1502, 1503
4-4-8 (04-04-02)	None	None
4-5-9 (04-05-01)	F30 (35)	1495
4-5-10 (04-05-02)	Same as 4-5-9	None
4-6-11 (04-06-01)	None	None
4-6-12 (04-06-02)	None	None
4-6-13 (04-06-03)	None	None

Comparison of ISSOE Tasks to Department of Defense Survey Questionnaire and Soldier's Manual Tasks (continued)

ISSOE	Questionnaire (Q)	Soldier's Manual (SM)
5-1-1 (05-01-01)	G38, G39, G43, G44	1526
5-1-2 (05-01-02)	None	None
5-1-3 (05-01-03)	None (terminology may differ)	None (terminology may differ)
5-2-4 (05-02-01)	G54, G55	None
5-2-5 (05-02-02)	None	None
5-2-6 (05-02-03)	G43, G44, G45, G48 (8), G49 (24), G50 (12), G51 (15)	None
5-2-7 (05-02-03	Same as 5-2-6	None
5-3-8 (05-03-01)	G10 (1), G11 (104), G12, G13, G14, G23, G34, G35	1518, 1519, 1520
5-4-9 (05-04-01)	G16, G17, G18	1521, 1522
5-4-10 (05-04-02)	None	None
5-5-11 (05-05-01)	None	None. See 1523
5-5-12 (05-05-02)	None	None
5-5-13 (05-05-03)	G19, G20, G21, G22, G30, G31, G32	None
5-5-14 (05-05-04)	None detected	None
5-5-15 (05-05-05)	See Duty G	None

Comparison of ISSOE Tasks to Department of Defense Survey Questionnaire and Soldier's Manual Tasks (continued)

ISSOE	Questionnaire (Q)	Soldier's Manual (SM)
5-5-16 (05-05-06)	G1 (128), G2, G3 (118), G4, G5, G6	None
Note: As in previous Units, overhaul and rebuild tasks are not detected in Q and SM.		
6-1-1 (06-01-01)	None	None
6-1-2 (06-01-02)	J16 (50)	1493
6-1-3 (06-01-03)	None	None
6-1-4 (06-01-04)	None	None
6-2-5 (06-02-01)	J15 (77)	None
6-3-6 (06-03-01)	None	None
6-4-7 (06-04-01)	None	None
6-4-8 (06-04-02)	None	None
Note: Unit 6 deals almost exclusively with functions related to privately owned automobiles. These tasks generally do not exist for military vehicles.		
7-1-1 (07-01-01)	None	None
7-2-2 (07-02-01)	None	None
7-2-3 (07-02-02)	None	None
7-2-4 (07-02-03)	None	None

Comparison of ISSOE Tasks to Department of Defense Survey Questionnaire and Soldier's Manual Tasks (continued)

ISSOE	Questionnaire (Q)	Soldier's Manual (SM)
7-2-5 (07-02-04)	None	None
7-3-6 (07-03-01)	None	None
7-4-7 (07-04-01)	None	None

Note: Although related tasks were not detected in Q or SM, some military vehicles have air conditioning, and most have some form of heater or defroster. However, repairs to these systems are generally performed "above" the unit level by specially trained technicians. Operation of military vehicles is generally not dependent upon functioning of these systems except in extreme climate areas.

Summary

The purpose of this study was to content validate the ISSOE automotive mechanics curriculum which to date is the most highly developed set of materials in the ISSOE system. To accomplish this task, the following four steps were undertaken.

1) An initial review of the ISSOE materials in terms of their "validity" as task statements.

2) A comparison of the ISSOE tasks to the tasks included in the V-TECS Automotive Mechanics catalog.

3) A comparison of the ISSOE tasks and the tasks contained in the Military Occupational Survey for Wheel Vehicle Mechanic and

4) A similar comparison with the tasks included in the Soldier's Manual for Wheel Vehicle Mechanic.

An initial review of the ISSOE materials found that 69% of the ISSOE tasks met task analysis criteria. Comments and suggestions for modification that would sharpen the ISSOE task statements are provided in the body of the report. A second external analysis yielded a 95% overall agreement with the initial analysis presented in the report.

Although there is a substantially different organization to the ISSOE curriculum and the V-TECS catalog, the comparison "detected" the ISSOE tasks that were contained in the V-TECS catalog. Seventy-seven percent of the ISSOE tasks were found to be included in the V-TECS listing. There was a 95% agreement between the initial analysis and the analysis undertaken by an independent evaluator.

A large number of ISSOE tasks (66%) that were included in V-TECS were found in more than a single V-TECS performance objective. That is, ISSOE tasks overlapped V-TECS performance objectives.

In comparing ISSOE materials to the U.S. Army Questionnaire for Wheel Vehicle Mechanic, 63B, it was found that 75% of the army tasks were detected in the ISSOE task statements. In carrying out this comparison only those army tasks which were actually performed by 50% or more of the soldiers were included. This somewhat arbitrary cutoff was deemed necessary in attempting to cousider only those military tasks which are most comparable to tasks required of entry-level civilian employees. The comparison of ISSOE to the "critical/must know" tasks found in the Soldier's Manual found 66% of these tasks could be detected in the ISSOE list.

The percentage of agreement of the three comparisons ranged from 66% to 75% indicating substantial agreement in some of the major areas included in ISSOE and the three other lists. The specific percentages of agreement for each of the ISSOE units in each comparison are presented in Tables 1, 2, and 3 in the body of the report.

As noted earlier in this report ISSOE suffers only from lack of functional organization and some errors in level of specificity, duplication, improper statement of task, and perhaps some shortcomings in coverage. It was interesting to note that the Soldier's Manual and the Questionnaire included tasks on horn maintenance, troubleshooting, and inspection of systems which did not appear in ISSOE. On the other hand, ISSOE is much more detailed in its coverage of Body Mechanical and Accessory tasks which are generally missing from the Army task list.

It is important to recognize that none of the four task lists examined covered every possible subject area to perfection. It is suggested that working from each of these listings the analyst could assemble a most profound list of the duties, tasks, skills, knowledges and miscellaneous requirements associated with the Automotive Mechanic occupation. It is clear that some items in that listing would go beyond the tasks offered in an entry-level course just as the Questionnaire task list includes many tasks which for all practical purposes exceed the task requirements of the entry-level soldiers. Nevertheless, such a listing would form the framework for the development of a multi-level training program in which progressively more difficult tasks requiring greater skill or knowledge could be introduced as the student advanced or returned for additional training.

Based on the work presented in this report, two recommendations seem reasonable. 1) Some of the ISSOE materials in other content areas should be subjected to analyses like the one undertaken in this report. 2) Field surveys for some of the ISSOE materials similar in nature to the U.S. Army Survey should be undertaken to verify the findings of the earlier content validation.

References

Berger, M.B. & Hawkins, H.H. An automated approach to occupational analysis. In T. Abramson, C. Tittle, and L. Cohen (Eds.) Handbook of Vocational Education Evaluation. Beverly Hills, Calif.: Sage Publications, 1979.

Campbell, D.F. & Lindsey, H.C. Air force performance ratings: Assessment methods for occupational education and evaluation. In T. Abramson, C. Tittle, and L. Cohen (Eds.) Handbook of Vocational Education Evaluation. Beverly Hills, Calif.: Sage Publications, 1979.

Teryek, C.J. An overview of job analysis: Methods, procedures and uses in vocational education. In T. Abramson, C. Tittle, and L. Cohen (Eds.) Handbook of Vocational Education Evaluation. Beverly Hills, Calif.: Sage Publications, 1979.

Wright, G.H. Public sector employment selection. Chicago, Illinois: International Personnel Management Association, 1974.

Appendix A

Results of Military Occupational Survey 63B
Wheel Vehicle Mechanic

MOS 63B AUTHORIZED GRADE 1-4 (EPMS SL 11) PG 1-4 PAGE 1

DUTY	JOB DESCRIPTION	CASES	TASKS	DUTIES	HOURS
		900	633	18	574
	CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS.....				
	AVERAGE PERCENT TIME SPENT BY ALL MEMBERS.....				
	AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING.....				
	PERCENT OF MEMBERS PERFORMING.....				
D-TSK	DUTY/TASK TITLE				
G	PERFORM POWER TRAIN COMPONENT MAINTENANCE	99.25	11.09	10.96	10.96
F	PERFORM GASOLINE/DIESEL ENGINE ELECTRICAL SYSTEM MAINTENANCE	99.08	21.77	20.98	30.93
D	PERFORM GASOLINE AND DIESEL FUEL SYSTEM MAINTENANCE	93.73	11.56	10.83	41.77
C	PERFORM GASOLINE AND DIESEL ENGINE MAINTENANCE	93.55	7.13	6.67	48.43
E	PERFORM GASOLINE/DIESEL ENGINE COOLING SYSTEM MAINTENANCE	93.03	5.90	5.49	53.92
H	PERFORM BRAKE MAINTENANCE	92.86	10.79	10.02	63.94
J	PERFORM BODY/CAB/FRAME/TOWING ATTACHMENT MAINTENANCE	87.11	4.54	3.97	67.92
R	PERFORM MILITARY DUTIES	83.45	4.73	3.95	71.87
M	PERFORM MAINTENANCE ADMINISTRATION	79.79	8.09	6.45	78.32
P	PERFORM WHEELED VEHICLE OPERATOR DUTIES	78.40	7.48	5.87	84.19
I	PERFORM STEERING SYSTEM MAINTENANCE	76.48	3.70	2.83	87.01
K	PERFORM SPRING AND SHOCK ABSORBER MAINTENANCE	74.39	2.73	2.03	89.05
A	PERFORM WHEELED VEHICLE MECHANIC SUPERVISION	56.79	7.74	4.39	93.44
O	PERFORM TIRE REPAIR DUTIES	55.92	2.67	1.49	94.93
L	MAINTAIN WHEELED VEHICLE WINCH, POWER TAKEOFF AND HOIST	54.70	2.18	1.19	96.13
B	PERFORM SHOP MANAGEMENT DUTIES	42.68	3.70	1.58	97.71
N	PERFORM WRECKER OPERATOR/RECOVERY OPERATION DUTIES	38.85	4.61	1.79	99.50
Q	PERFORM GENERATOR SET OPERATOR DUTIES	14.29	2.88	.41	99.91

Results of Military Occupational Survey 63B

Wheel Vehicle Mechanic (continued)

MOS 63B0 AUTHORIZED GRADE 1-4 (EPMS SL 1) PG 1-4 PAGE 1

TASK	JOB DESCRIPTION	CASES 900	TASKS 633	DUTIES 18	HOURS 574				
		CUMULATIVE SUM OF AVERAGE PERCENT TIME SPENT BY ALL MEMBERS							TASK SEQ
		AVERAGE PERCENT TIME SPENT BY ALL MEMBERS							NO
		AVERAGE PERCENT TIME SPENT BY MEMBERS PERFORMING							
		PERCENT OF MEMBERS PERFORMING							
D-TSK		DUTY/TASK TITLE							
G	10	ADJUST CLUTCH LINKAGE	89.99	.86	.73	.73			
H	16	BLEED BRAKE SYSTEM	89.15	.82	.69	1.42			
E	23	ADJUST FAN BELTS	83.95	.81	.68	2.10			
H	8	ADJUST HAND PARKING BRAKE	82.58	.85	.71	2.81			
E	14	REPLACE RADIATOR HOSES	82.90	.66	.54	3.35			5
E	22	REPLACE FAN BELTS	81.88	.72	.59	3.94			
F	60	TEST BATTERIES	81.53	.79	.64	4.58			
G	48	SERVICE WHEEL BEARING	80.84	.89	.72	5.30			
F	51	REPLACE HEAD AND TAIL LIGHTS	80.49	.68	.55	5.85			
F	42	REPLACE SPARK PLUGS	80.14	.6[illegible]	.51	6.36			10
F	50	TEST HEAD AND TAIL LIGHTS	79.79	.8[illegible]	.65	7.01			
G	50	REPLACE WHEEL BEARING	79.62	.7[illegible]	.62	7.63			
F	61	REPLACE BATTERIES	79.44	.81	.64	8.27			
C	23	REPLACE ENGINE OIL FILTER ELEMENT	77.87	.86	.67	8.94			
G	51	REPLACE WHEEL SEALS	77.35	.78	.61	9.54			15
F	18	ADJUST ALTERNATOR BELT	75.61	.69	.49	10.03			
F	40	SERVICE SPARK PLUGS	75.26	.62	.46	10.49			
F	62	REPLACE BATTERY CABLES	74.91	.66	.49	10.99			
G	66	ADJUST SERVICE BRAKE SHOES	74.74	.69	.52	11.50			
H	7	INSPECT BRAKE SYSTEMS	74.74	.75	.56	12.07			20
F	14	REPLACE ALTERNATOR	74.56	.60	.45	12.51			
F	17	REPLACE GENERATOR	74.56	.59	.44	12.95			
C	1	TROUBLESHOOT 1/4 TON SERIES GASOLINE ENGINE MALFUNCTIONS	74.39	.73	.54	13.50			
G	49	ADJUST WHEEL BEARING	74.39	.83	.62	14.11			
H	11	ADJUST HAND BRAKE SHOE	74.39	.71	.53	14.64			25
E	13	REPLACE RADIATOR	74.22	.58	.43	15.07			
H	9	REPLACE HAND PARKING BRAKE	73.69	.69	.51	15.58			
F	41	ADJUST SPARK PLUGS	73.52	.62	.45	16.03			
F	39	ADJUST POINT SET	73.34	.58	.42	16.46			
H	13	REPLACE MASTER CYLINDER	73.00	.61	.45	16.91			30
H	15	REPLACE WHEEL CYLINDER	72.65	.63	.46	17.36			
E	12	INSPECT ENGINE COOLING SYSTEMS	72.30	.69	.50	17.86			
F	19	REPLACE ALTERNATOR BELT	72.30	.58	.42	18.28			
H	12	REPLACE HAND BRAKE SHOE	72.13	.67	.49	18.77			
F	30	REPLACE INSTRUMENT GAUGES	71.95	.65	.47	19.24			35
H	3	TROUBLESHOOT 2 1/2 TON SERIES BRAKES FOR MALFUNCTIONS	71.95	.62	.45	19.69			
C	22	SERVICE ENGINE OIL FILTER ELEMENT	71.78	.84	.60	20.29			
H	21	ADJUST HAND BRAKE LINKAGE	71.78	.69	.46	20.75			
D	46	ADJUST THROTTLE CONTROL ASSEMBLY	71.60	.59	.42	21.17			
F	45	REPLACE DIRECTIONAL SIGNAL RELAY CONTROL ASSEMBLY	71.60	.64	.47	21.65			40
C	5	TROUBLESHOOT 2 1/2 TON SERIES DIESEL ENGINES	71.43	.80	.57	22.22			
G	45	REPLACE SERVICE BRAKE SHOES	71.43	.61	.43	22.65			

Results of Military Occupational Survey 63B
Wheel Vehicle Mechanic (continued)

D-TSK		DUTY/TASK TITLE	PG	J-W	PAGE	Z	
F	54	REPLACE HORN BUTTON SWITCH	71.25	.61	.99	23.09	
D	12	ADJUST GASOLINE ENGINE CARBURETOR	71.08	.60	.93	23.52	
H	1	TROUBLESHOOT 1/4 TON SERIES BRAKES FOR MALFUNCTIONS	69.16	.63	.93	23.95	45
D	28	REPLACE DIESEL PRIMARY FUEL FILTER	68.99	.56	.39	29.39	
H	17	REPLACE BRAKE LINES/FITTINGS/HOSES	68.82	.59	.90	29.79	
D	1	TROUBLESHOOT 1/4 TON SERIES GASOLINE FUEL SYSTEMS	67.94	.56	.38	25.12	
R	1	MAINTAIN M16 RIFLE, MAGAZINE AND AMMUNITION	67.94	.98	.67	25.79	
J	16	REPLACE WINDSHIELD WIPER MOTOR	67.60	.67	.95	26.29	50
D	13	REPLACE GASOLINE ENGINE CARBURETOR	66.90	.55	.37	26.61	
D	47	REPLACE THROTTLE CONTROL ASSEMBLY	66.90	.57	.38	26.99	
F	43	REPLACE SPARK PLUG LEADS	66.90	.53	.35	27.35	
R	2	ENGAGE TARGETS WITH M16 RIFLE	66.90	.82	.55	27.89	
D	21	REPLACE GASOLINE LINES AND FITTINGS	66.72	.56	.37	28.26	55
F	1	TROUBLESHOOT 1/4 TON SERIES GASOLINE ENGINE ELECTRICAL SYS	65.85	.53	.35	28.61	
E	31	REPLACE IGNITION STARTER SWITCH	64.98	.51	.33	28.94	
F	64	INSPECT TRAILER ELECTRICAL SYSTEMS	64.98	.54	.35	29.29	
H	34	ADJUST AIR COMPRESSOR DRIVE BELT	64.98	.56	.37	29.66	
D	48	ADJUST GASOLINE CHOKE CONTROL ASSEMBLY	64.63	.51	.33	29.99	60
F	59	REPLACE HORN ASSEMBLY	64.96	.53	.34	30.33	
D	29	REPLACE DIESEL SECONDARY FILTER	64.29	.56	.36	30.69	
F	5	TROUBLESHOOT 2 1/2 TON SERIES DIESEL ENGINE ELECTRICAL SYS	64.29	.63	.41	31.10	
F	23	REPLACE REGULATOR	64.11	.61	.32	31.42	
F	44	REPLACE DIRECTIONAL SIGNAL RELAYS	63.94	.58	.35	31.77	65
F	34	INSPECT IGNITION DISTRIBUTOR	63.76	.54	.35	32.12	
F	65	INSPECT CHASSIS WIRING HARNESS	63.41	.53	.34	32.46	
H	14	SERVICE MASTER CYLINDER	62.54	.61	.38	32.84	
F	26	REPLACE STARTING MOTOR	62.37	.53	.33	33.17	
F	55	REPLACE HORN WIRE	62.37	.50	.31	33.48	70
J	18	REPLACE SPEEDOMETER	62.20	.50	.31	33.80	
D	22	REPLACE DIESEL LINES AND FITTINGS	62.02	.58	.36	34.15	
F	36	ADJUST IGNITION DISTRIBUTOR	61.67	.49	.30	34.46	
H	33	REPLACE AIR COMPRESSOR DRIVE BELT	61.32	.56	.34	34.80	
D	5	TROUBLESHOOT 2 1/2 TON SERIES DIESEL FUEL SYSTEMS	61.15	.58	.36	35.15	75
F	16	TEST GENERATOR	61.15	.53	.32	35.47	
J	15	REPLACE WINDSHIELD	61.15	.60	.37	35.84	
F	37	REPLACE IGNITION DISTRIBUTOR	60.63	.47	.29	36.12	
D	19	TEST GASOLINE ENGINE FUEL PUMP	60.28	.46	.28	36.40	
F	52	REPAIR HEAD AND TAIL LIGHTS	60.28	.64	.40	36.80	80
F	38	REPLACE IGNITION DISTRIBUTOR CAP	59.93	.48	.29	37.09	
F	47	REPLACE STOPLIGHT SWITCH	59.58	.48	.29	37.37	
F	63	REPAIR BATTERY CABLES	59.41	.57	.34	37.71	
E	1	TROUBLESHOOT 1/4 TON SERIES GASOLINE ENGINE COOLING SYSTEM	59.23	.49	.29	38.00	
F	12	TEST ALTERNATOR	58.89	.48	.28	38.29	85
D	50	ADJUST DIESEL ENGINE FUEL SHUT-OFF CABLE ASSEMBLY	58.36	.52	.30	38.59	
E	5	TROUBLESHOOT 2 1/2 TON SERIES DIESEL ENGINE COOLING SYSTEM	58.19	.49	.28	38.87	
C	2	TROUBLESHOOT 1 1/4 TON SERIES GASOLINE ENGINES	57.84	.70	.40	39.27	
D	15	REPLACE GASOLINE ENGINE FUEL PUMP	57.84	.42	.24	39.52	
E	15	REPLACE RADIATOR LINES AND FITTINGS	57.67	.50	.29	39.81	90
D	11	INSPECT FUEL SYSTEMS	57.32	.61	.35	40.16	
P	3	DRIVE 2 1/2 TON CARGO TRUCK	57.32	.77	.44	40.60	
R	10	MAINTAIN PROTECTIVE MASK AND ACCESSORIES	57.32	.86	.49	41.09	
C	21	INSPECT GASOLINE ENGINE VALVE COVER GASKET	56.97	.63	.36	41.45	
D	43	ADJUST ACCELERATOR PEDAL LINKAGE	56.97	.45	.26	41.71	95
E	16	REPLACE THERMOSTAT	56.10	.45	.25	41.96	

Results of Military Occupational Survey 63B
Wheel Vehicle Mechanic (continued)

D-TSK		DUTY/TASK TITLE	PG 1-4 PAGE 3				
M	2	TROUBLESHOOT 1 1/4 TON SERIES BRAKES FOR MALFUNCTIONS	$6.10	.64	.31	$2.27	
P	1	DRIVE 1/4 TON UTILITY TRUCK	$5.92	.73	.41	$2.68	
F	48	REPLACE BEAM SELECTOR SWITCH	$5.75	.42	.23	$2.91	
E	11	SERVICE RADIATOR	$5.57	.60	.33	$3.25	100
F	54	REPAIR HORN WIRE	$5.40	.48	.26	$3.51	
F	35	TEST IGNITION DISTRIBUTOR	$5.23	.48	.26	$3.77	
F	15	REPLACE ALTERNATOR DRIVE AND PULLEY	$4.88	.51	.28	$4.06	
G	11	REPLACE CLUTCH LINKAGE	$4.36	.56	.30	$4.36	
D	9	REPLACE GASOLINE CHOKE CONTROL ASSEMBLY	$4.01	.47	.25	$4.61	105
F	25	TEST STARTING MOTOR	$4.01	.49	.26	$4.88	
C	7	TROUBLESHOOT 5 TON SERIES DIESEL ENGINES	$3.83	.67	.36	$5.23	
F	11	INSPECT ENGINE ELECTRICAL SYSTEMS	$3.83	.58	.31	$5.55	
K	1	TROUBLESHOOT 1/4 TON SERIES SPRING AND SHOCK ABSORBERS	$3.31	.46	.25	$5.79	
K	7	INSPECT SPRINGS AND SHOCK ABSORBERS	$3.31	.63	.33	$6.13	110
F	13	ADJUST ALTERNATOR	$3.14	.50	.27	$6.39	
I	7	INSPECT STEERING SYSTEM	$3.14	.57	.31	$6.70	
D	51	REPLACE DIESEL ENGINE FUEL SHUT-OFF CABLE ASSEMBLY	$2.79	.51	.27	$6.97	
E	21	REPLACE WATER PUMP	$2.79	.48	.24	$7.21	
J	21	REPLACE TACHOMETER	$2.61	.47	.25	$7.46	115
M	32	MAKE ENTRIES ON EQUIP INSPECTION WORKSHEET (DA FORM 2404)	$2.61	.89	.47	$7.92	
F	49	REPLACE AIR WARNING BUZZER	$2.44	.43	.23	$8.15	
G	3	TROUBLESHOOT 2 1/2 TON SERIES POWER TRAIN FOR MALFUNCTIONS	$2.09	.50	.26	$8.41	
F	22	TEST REGULATOR	$1.92	.46	.24	$8.65	
F	48	REPLACE SLAVE RECEPTACLES	$1.74	.47	.24	$8.89	120
G	8	REPLACE CLUTCH PEDAL PAD	$1.57	.44	.22	$9.11	
G	37	REPLACE PROPELLER SHAFTS	$1.57	.49	.26	$9.37	
F	53	ADJUST HEADLIGHTS	$1.39	.44	.23	$9.59	
I	3	TROUBLESHOOT 2 1/2 TON SERIES STEERING SYS FOR MALFUNCTION	$1.39	.44	.23	$9.82	
C	11	INSPECT ENGINE ASSEMBLY	$0.87	.84	.43	$0.26	125
F	29	REPLACE GENERATOR PULLEY	$0.87	.46	.23	$0.48	
D	20	REPLACE LOW PRESSURE DIESEL FUEL LINES AND FITTINGS	$0.70	.51	.26	$0.74	
G	1	TROUBLESHOOT 1/4 TON SERIES POWER TRAIN FOR MALFUNCTIONS	$0.70	.49	.25	$0.99	
M	4	TROUBLESHOOT 5 TON SERIES BRAKES FOR MALFUNCTIONS	$0.52	.62	.31	$1.30	
J	7	INSPECT BODY/CAB/FRAME/TOWING ATTACHMENTS	$0.35	.67	.34	$1.64	130
D	30	REPLACE DIESEL FINAL FILTER	$0.17	.49	.25	$1.89	
K	3	TROUBLESHOOT 2 1/2 TON SERIES SPRING AND SHOCK ABSORBERS	$0.00	.46	.23	$2.11	
F	69	REPLACE GROUND STRAPS	$9.65	.42	.21	$2.32	
I	1	TROUBLESHOOT 1/4 TON SERIES STEERING SYS FOR MALFUNCTIONS	$9.65	.46	.22	$2.55	
G	58	REPLACE CV BOOT HOUSING	$9.48	.67	.33	$2.88	135
G	61	REPLACE BRAKE DRUM	$9.30	.42	.21	$3.09	
C	20	REPLACE ENGINE COVER GASKETS	$9.13	.59	.29	$3.38	
F	33	REPLACE PUSH BUTTON	$9.13	.41	.20	$3.58	
G	39	REPLACE POWER TRAIN UNIVERSAL JOINTS	$9.13	.55	.27	$3.85	
H	22	REPLACE HAND BRAKE LINKAGE	$8.95	.46	.22	$4.08	140
K	16	REPLACE SHOCK ABSORBERS	$8.95	.48	.24	$4.31	
A	9	TAKE PROTECTIVE COVER AGAINST CBR HAZARDS	$8.95	.75	.37	$4.68	
G	7	INSPECT POWER TRAIN	$8.61	.60	.29	$4.98	
D	2	TROUBLESHOOT 1 1/4 TON SERIES GASOLINE FUEL SYSTEMS	$8.43	.53	.26	$5.23	
D	24	REPLACE 1/4 TON GASOLINE INTAKE FUEL FILTER	$8.43	.47	.23	$5.46	145
J	3	TROUBLESHOOT 2 1/2 TON SERIES BODY/CAB/FRAME/TOWING ATCH	$8.43	.50	.24	$5.70	
C	13	SERVICE ENGINE ASSEMBLY	$8.26	.86	.41	$6.11	
J	1	TROUBLESHOOT 1/4 TON SERIES BODY/CAB/FRAME/TOWING ATCH	$7.74	.49	.23	$6.35	
G	43	REPLACE AXLE SHAFT AND UNIVERSAL JOINT ASSEMBLY	$7.56	.46	.22	$6.57	
E	44	TEST CHASSIS WIRING HARNESS	$7.39	.43	.20	$6.77	150

Appendix B

Task Listing from Soldier's Manual
(FM 9-63B 1/2) MOS 63B Wheel Vehicle Mechanic

TASK/ PERFORMANCE NUMBER	TITLE	INITIAL TNG SKILL LEVEL
	SECTION I. LOGISTICAL MANAGEMENT	
091-63A-1300	Use Department of the Army (DA) Pamphlet 310-4	1
091-63A-1301	Prepare TAMMS Forms Used by Vehicle Operator	1
091-63A-1302	Perform Equipment Serviceability Criteria (ESC)	1
091-63A-2303	Use DA Pam 310-7	2
091-63A-2304	Describe Types of Modification Work Orders (MWO)	2
	Section II. SUPPLY	
091-63A-1340	Locate and Record National Stock Number (NSN) for a Repair Part	1
091-63A-2341	Complete Entries on Document Register for Supply Action (DA Form 2064) and on Record of Demands (DA Form 3318)	2
	SECTION III. MAINTENANCE	
091-63A-1360	Maintain Assigned Tool Kit/Set	1
091-63A-1361	Maintain Individual Clothing and Equipment	1

Appendix B

Task Listing from Soldier's Manual
(FM 9-63B 1/2) MOS Wheel Vehicle Mechanic

TASK/ PERFORMANCE NUMBER	TITLE	INITIAL TNG SKILL LEVEL
	SECTION I. MAINTENANCE OF WHEELED VEHICLE ENGINES AND IGNITION SYSTEMS	
091-63B-1401	Inspect Vehicle Engines	1
091-63B-1402	Troubleshoot Vehicle Engines	1
091-63B-1403	Perform Primary Circuit Resistance Test on 1/4-Ton Truck	1
091-63B-1404	Perform Breaker Point Dwell Test on 1/4-Ton Truck	1
091-63B-1405	Remove and Clean Spark Plugs and Set Spark Plug Gap	1
091-63B-1406	Approximate Timing by Distributor Positioning	1
091-63B-1407	Perform Precision Timing of an Engine	1
091-63B-1408	Perform a Compression Test on a Vehicle Engine	1
091-63B-1409	Perform a Manifold Vacuum Test on a Carbureted Engine	1
091-63B-1410	Use Torque Wrench to Torque Bolts	1
091-63B-1411	Adjust Valve Tappets	1
091-63B-1412	Remove and Install Oil Filter Element on 1-1/4-Ton Truck M561	1
091-63B-1413	Replace Intake and Exhaust Manifolds	1
091-63B-1414	Remove and Install Air Box Drain Tube on a 1-1/4-Ton Truck M561	1
	SECTION II. MAINTENANCE OF WHEELED VEHICLE COOLING SYSTEMS	
091-63B-1431	Replace Thermostat	1
091-63B-1432	Perform an Air Suction Test on a Cooling System of Medium Wrecker M816	1

Task Listing from Soldier's Manual
(FM 9-63B 1/2) MOS 63B Wheel Vehicle Mechanic (Continued)

091-63B-1433	Remove and Install a Water Pump on a 2-1/2-Ton Truck M35	1
091-63B-1434	Remove and Replace the Radiator on a 2-1/2-Ton Truck M35A2	1

SECTION III. MAINTENANCE OF WHEELED VEHICLE FUEL SYSTEMS

091-63B-1445	Perform a Fuel Pump Pressure Test on a 1/4-Ton Truck M151A2	1
091-63B-1446	Adjust the Choke, Throttle, and Accelerator Controls on the 1/4-Ton Truck M151	1
091-63B-1447	Adjust the Idle and Idle Mixture on the Carburetor of the M151-Series 1/4-Ton Truck	1
091-63B-1448	Remove and Replace Carburetor on an M151-Series 1/4-Ton Truck	1
091-63B-1449	Check Fuel Pump Safety Switch (Oil Pressure Safety Switch)	1
091-63B-1450	Adjust Accelerator Linkage on 1-1/4-Ton Truck M561	1
091-63B-1451	Adjust Engine Stop Cable on a 1/4-Ton Truck M561	1
091-63B-1452	Troubleshoot Bosch Fuel System on a 2-1/2-Ton Truck M35A2	1
091-63B-1453	Inspect and Replace Engine Fuel Filters	1
091-63B-1454	Replace Fuel Tank Pump and Fuse Asembly	1
091-63B-1455	Remove, Service, and Install Primary Fuel Filter Element on the 8-Ton Truck M520	1
091-63B-1456	Remove and Replace Secondary Fuel Filter Element on the 8-Ton Truck M520	1

SECTION IV. MAINTENANCE OF WHEELED VEHICLE AIR INDUCTION AND EXHAUST SYSTEMS

091-63B-1467	Remove, Service, Repair, and Install an Air Cleaner	1
091-63B-1468	Remove and Install Air Cleaner Element on a 1-1/4-Ton Truck M561	1

Task Listing from Soldier's Manual
(FM 9-63B 1/2) MOS 63B Wheel Vehicle Mechanic (continued)

091-63B-1469	Remove and Install Air Cleaner Lines on a 1-1/4-Ton Turck M561	1
091-63B-1470	Remove a Defective Muffler From a 1-1/4-Ton Truck M561	1
091-63B-1471	Replace a Defective Tailpipe on a 1-1/4-Ton Truck M561	1

SECTION V. MAINTENANCE OF WHEELED VEHICLE ELECTRICAL SYSTEMS

091-63B-1482	Perform a DC Voltage Test Using a Multimeter	1
091-63B-1483	Perform an AC Voltage Test Usinga Multimeter	1
091-63B-1484	Perform a Resistance Test Using a Multimeter	1
091-63B-1485	Perform a Continuity Test on a Electrical Circuit Using a Multimeter	1
091-63B-1486	Perform a DC Voltage Test Using a Low Voltage Circuit Tester (LVCT)	1
091-63B-1487	Perform a DC Current Test Using a Low Voltage Circuit Tester (LVCT)	1
091-63B-1488	Perform a Load Bank and Field Resistance Test Using the Low Voltage Circuit Tester (LVCT)	1
091-63B-1489	Inspect the Batteries in a Wheeled Vehicle	1
091-63B-1490	Inspect the Electrical System on a Wheeled Vehicle	1
091-63B-1491	Remove and Replace the Generator or Alternator on Wheeled Vehicles	1
091-63B-1492	Repair Defective Wire in a Vehicle Wiring Harness	1
091-63B-1493	Troubleshoot Windshield Wiper Circuit	1
091-63B-1494	Perform Generator Load Test, 25-Ampere DC Generator, on an M151-Series 1/4-Ton Truck	1
091-63B-1495	Troubleshoot Battery-Generator Indicator Gage	1

Task Listing from Soldier's Manual
(FM 9-63B) MOS 63B Wheel Vehicle Mechanic (continued)

091-63B-1496	Troubleshoot Directional Signal System	1
091-63B-1497	Troubleshoot Lighting System on an M151-Series 1/4-Ton Truck	1
091-63B-1498	Perform Voltage Regulator Test	1
091-63B-1499	Perform Current Limiter Test on a Generator Regulator	1
091-63B-1500	Perform a Horn Circuit Voltage Test	1
091-63B-1501	Perform an Alternator Output Test	1
091-63B-1502	Remove and Replace Starter Motor	1
091-63B-1503	Repair and Install a Damaged Cable Assembly	1

SECTION VI. MAINTENANCE OF WHEELED VEHICLE POWER TRAINS AND COMPONENTS

091-63B-1517	Inspect the Power Trains of Wheeled Vehicles	1
091-63B-1518	Troubleshoot Clutches on Wheeled Vehicles	1
091-63B-1519	Adjust Clutch Linkage on an M151-Series 1/4-Ton Truck	1
091-63B-1520	Adjust Clutch Pedal Free Travel on an M816 Medium Wrecker	1
091-63B-1521	Disassemble Transmission Control	1
091-63B-1522	Adjust Transmission Control and Linkage	1
091-63B-1523	Troubleshoot Automatic Transmissions	1
091-63B-1524	Remove and Install Propeller Shafts	1
091-63B-1525	Inspect, Service, Recplace Hub and Brakedrum Assembly, Inner Oil Seal, and Bearing Cones and Cups to Include Wheel Bearing Adjustment	1
091-63B-1526	Inspect, Repair, and Replace Front Axle Shaft With Universal Joint	1

SECTION VII. MAINTENANCE OF WHEELED VEHICLE BRAKE SYSTEMS

091-63B-1544	Inspect Brake Systems on Wheeled Vehicles	1

Task Listing from Soldier's Manual
(FM 9-63B MOS 63B Wheel Vehicle Mechanic (continued)

091-63B-1545	Troubleshoot the Brake System on a Wheeled Vehicle	1
091-63B-1546	Remove and Replace a Service Brake Drum, Shoe, and Lining Assembly on M151-Series 1/4-Ton Truck	1
091-63B-1547	Adjust Parking Brake Handle and Linkage on the 1-1/4-Ton Truck M561	1
091-63B-1548	Remove and Replace Parking Brake Drum and Shoes on the 1-1/4-Ton Truck M561	1
091-63B-1549	Remove and Replace the Service Brake Assembly on the 1-1/4-Ton Truck M561	1
091-63B-1550	Adjust and Bleed the Service Brakes on the 1-1/4-Ton Truck M561	1
091-63B-1551	Perform a Service Brake Pedal Free Travel Adjustment on a 2-1/2-Ton Truck M35A2	1
091-63B-1552	Perform Major Brake Adjustment on a 2-1/2-Ton Truck M35A2	1
091-63B-1553	Remove and Replace a Master Cylinder	1
091-63B-1554	Remove and Replace an Air Reservoir on a 2-1/2-Ton Truck 35A2	1
091-63B-1555	Remove and Replace the Air-Hydraulic Cylinder on a 2-1/2-Ton Truck M35A2	1
091-63B-1556	Remove Wheel Cylinder on a 2-1/2-Ton Truck M35A2	1
091-63B-1557	Bleed Hydraulic Brake System on a 2-1/2-Ton Truck M35A2	1
091-63B-1558	Remove and Install a Brake Pedal and Linkage on a 2-1/2-Ton Truck M35A2	1
091-63B-1559	Remove and Replace the Hand Brake Lever and Linkage on a 2-1/2-Ton Truck M35A2	1
091-63B-1560	Replace and Adjust Hand Brake Shoes and Drum	1
SECTION VIII.	MAINTENANCE OF WHEELED VEHICLE STEERING SYSTEMS	
091-63B-1579	Inspect the Steering System on a Wheeled Vehicle	1

Task Listing from Soldier's Manual
(FM 9-63B 1/2) MOS 63B Wheel Vehicle Mechanic (continued)

891-63B-1580	Adjust Toe-In on a Wheeled Vehicle	1
891-63B-1581	Repair Steering Systems on Wheeled Vehicles	1
891-63B-1582	Remove and Replace a Steering Wheel	1
891-63B-1583	Remove and Replace Idler Arm	1
891-63B-1584	Perform Tractor and Carrier Toe-In Adjustment on a 1-1/4-Ton Truck M561	1
891-63B-1585	Remove Tractor and Carrier Steering Knuckle on a 1-1/4-Ton Truck M561	1
891-63B-1586	Install Steering Knuckle on a 1-1/4-Ton Truck M561	1
891-63B-1587	Remove and Install Tractor Pitman Arm on a 1-1/4-Ton Truck M561	1
891-63B-1588	Remove and Install a Tractor Steering Gear Box on a 1-1/4-Ton Truck M561	1
891-63B-1589	Remove and Install a Tractor Idler Arm on a 1-1/4-Ton Truck M561	1
891-63B-1590	Remove, Disassemble, Inspect, and Install Tractor and Carrier Tie Rod Assemblies on a 1-1/4-Ton Truck M561	1
891-63B-1591	Perform a Steering Gear Adjustment on a 2-1/2-Ton Cargo Truck M35A2	1
891-63B-1592	Repair, Replace, and Adjust a Drag Link	1
891-63B-1593	Remove and Install a Steering Knuckle Boot	1
891-63B-1594	Perform Power Steering Cylinder Travel Adjustment	1
891-63B-1595	Remove and Install Steering Column Bushings	1
891-63B-1596	Install Power Steering Pressure Hose, Return Hose, and Related Parts	1

SECTION IX. MAINTENANCE OF WHEELED VEHICLE SUSPENSION SYSTEMS

891-63B-1613	Inspect the Suspension Systems on Wheeled Vehicles	1

Task Listing from Soldier's Manual
(FM 9-63B 1/2) MOS 63B Wheel Vehicle Mechanic (continued)

091-63B-1614	Troubleshoot Wheeled Vehicle Suspension Systems	1
091-63B-1615	Repair Wheeled Vehicle Suspension Systems	1
091-63B-1616	Remove and Replace Shock Absorbers	1
091-63B-1617	Remove and Replace Front Lower Ball Joints	1
091-63B-1618	Remove, Inspect, Repair, and Install a Tractor Front Torque Tube Bearing Assembly on a 1-1/4-Ton Truck M561	1
091-63B-1619	Remove Front and Rear Upper Suspension Arms on a 1-1/4-Ton Truck M561	1
091-63B-1620	Install Tractor Front and Carrier Shock Absorbers	1
091-63B-1621	Remove Center Axle Leaf Springs	1
091-63B-1622	Install Center Axle Leaf Springs	1
091-63B-1623	Remove Inner and Outer Center Axle Shock Absorbers	1
091-63B-1624	Remove and Replace Front Springs	1
091-63B-1625	Remove, Inspect, and Replace Rear Spring Seats on a 2-1/2-Ton Truck	1
091-63B-1626	Remove and Replace the Rear Spring Assembly on the 5-Ton Truck M809	1
091-63B-1627	Remove and Replace the Front Spring and Shackles on the 5-Ton Truck M809	1

SECTION X. MAINTENANCE AND OPERATION OF WHEELED VEHICLE CRANES AND WINCHES

091-63B-1641	Operate Front Winch on a Wrecker Truck M816	1
091-63B-1642	Operate Rear Winch on a Wrecker Truck M816	1
091-63B-1643	Perform Lifting Operation With a Wrecker Truck M816	1
091-63B-1644	Test and Adjust Pressure Relief Valve	1

Task Listing from Soldier's Manual

(FM 9-63B 1/2) MOS 63B Wheel Vehicle Mechanic (continued)

091-63B-1645	Remove and Install a Front Winch Cable on a Medium Wrecker M816	1
091-63B-1646	Adjust Winch Brakes and Cable Tensioner	1
091-63B-1647	Adjust Front Winch Automatic Brake	1
091-63B-1648	Replace Front Winch Shearpin	1
091-63B-1649	Maintain and Use Basic Issue Items	1